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MODERN

Machine Shop

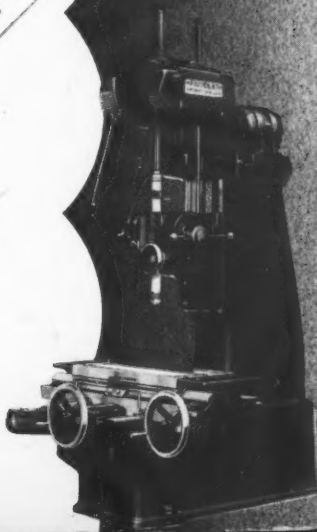
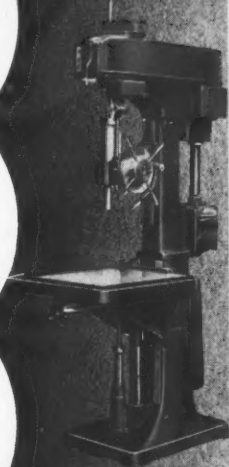
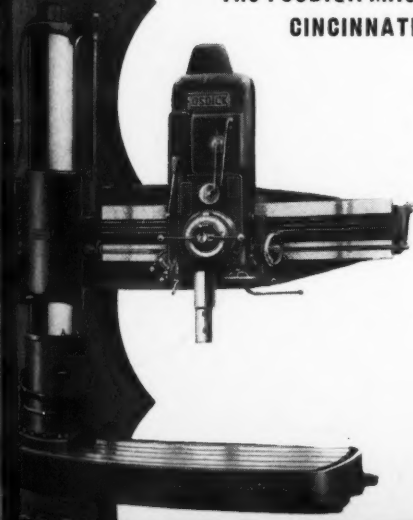
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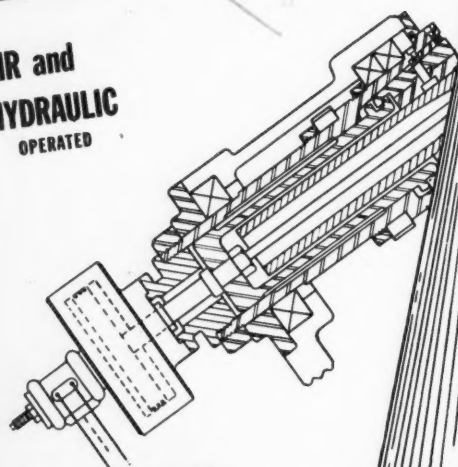
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MODERN Machine Shop

HOWARD CAMPBELL, Editor

Volume 13

DECEMBER, 1940

Number 7

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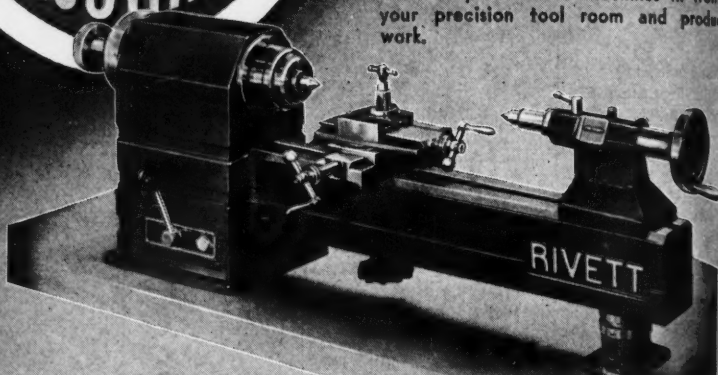
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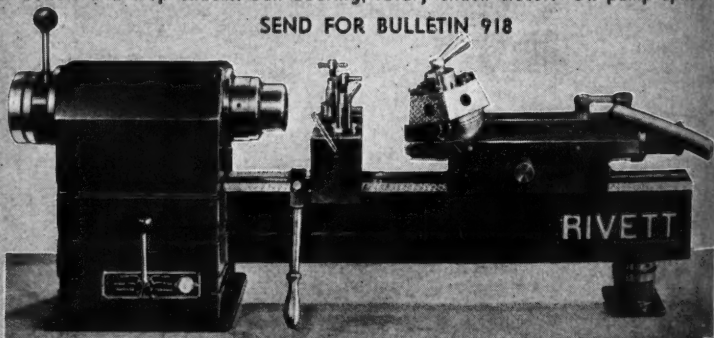
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DECEMBER, 1940

VOL. 13, No. 7

We Present--

—as the feature article in this month's issue an outline of the more important operations in the manufacture of the Linotype typesetting machine. With a normal output of 20,000 characters per hour, the typesetting machine is responsible more than any other single factor for the lowered costs of printing which have made books and magazines such as MODERN MACHINE SHOP available to all who wish or need them.

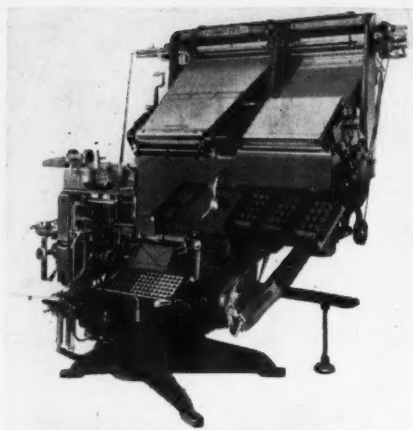
—on page 72 a paper which comprises in effect a condensed course in the metallurgy of brass and bronze alloys. The author—who is himself a foundry superintendent—explains the effects of various alloys upon the machining characteristics of the metals. This article should be especially valuable to the machine shop executive.

—on page 92 some valuable ideas for the superintendent or foreman of the small shop where every machine must be kept producing continuously in order to meet delivery dates, keep the force busy, and keep the overhead percentage down. The author operates just such a shop himself and knows his stuff.

—on page 101 the fifth article on the general-purpose use of carbide tools, by James R. Longwell. These articles have been designed to point the way to the advantages which can be secured through the use of carbide tools in the smaller shop, and the small shop manager who has not read them has been overlooking a good bet.

—some unusually good "Ideas" this month, including an excellent concave radius truing fixture for the cylindrical grinding machine, an efficient fixture for holding thin plates in the planer or shaper, and others.

—the usual cartoon by Wesser and other features. And may we present Christmas and New Year's Greetings to our readers together with a promise that MODERN MACHINE SHOP will be even more interesting and valuable during 1941 than it has been throughout the past year.



Model 32 Linotype Composing Machine. The Operator Concentrates His Attention on the Keyboard While Casting and Distribution Proceed Automatically. Normal Output is 20,000 Characters Per Hour.

THE art of representing thought by means of written characters has been known for some six thousand years, but it was not until the fifteenth century that printing, as we know it today, became a practical reality. In the early part of that century Johannes Gutenberg perfected the idea of printing from movable types, and since that time the dissemination of knowledge by means of the printed word has developed with constantly-increasing speed.

The setting of type was a hand

Production Operations on the Linotype Typesetting Machine

By HOWARD CAMPBELL
Editor, Modern Machine Shop

task, however, and for two centuries or more the desirability of setting type by mechanical means continued to intrigue the inventors. None of their inventions succeeded commercially until 1885, when Ottmar Mergenthaler developed a typesetting machine which, because it produces a completely-composed line of type on

a single bar of metal, is called the "Linotype."

The Linotype is operated with a

Fig. 1—Milling Base of Linotype Composing Machine, Using an Ingersoll Milling Machine of Special Design. Sixteen Cutters are Used.

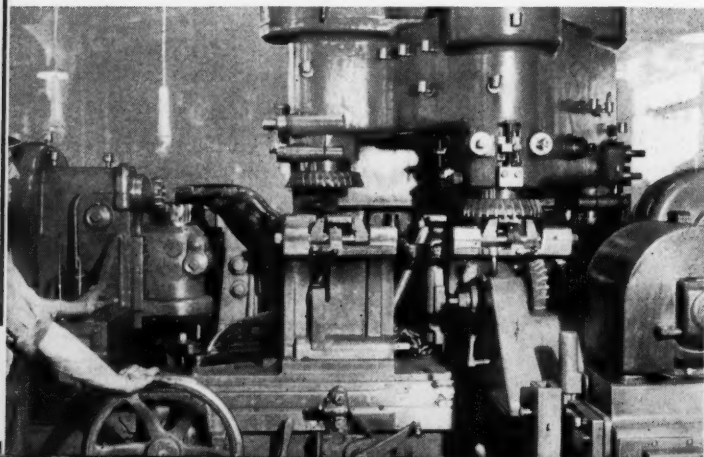


Fig. 2—Holes Drilled by in

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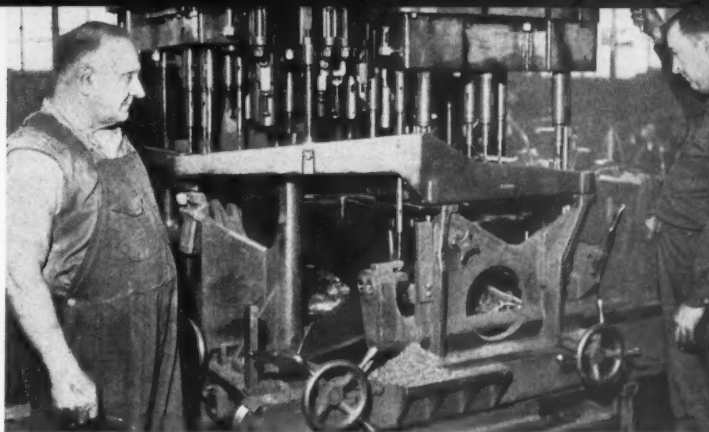
accuracy, the mar the mor Some o scribed i

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composed

Fig. 3—To Holes in th er Brac bracket is Reversibl Travels or

Fig. 2—Twenty-Five Holes in the Base Are Drilled Simultaneously in this Machine



keyboard similar to that on a typewriter, and utilizes the principle of a mold which casts a line of type of the size and kind required as determined by a corresponding line of matrices which have, by means of the keyboard, been mechanically assembled. Most present-day magazines, books, and newspapers are printed with type set on the Linotype or on other similar machines designed on the same principles.

The Linotype machine is manufactured by the Mergenthaler Linotype Company, Brooklyn, N. Y. Considering the unusual requirements of accuracy, the operations involved in the manufacture of the Linotype are of more than ordinary interest. Some of these operations are described in this article.

The Linotype machine normally produces six composed lines a minute; thus in average sizes of text matter an output of 20,000 composed characters

per hour is a normal output. This means that every part of the machine must be machined and fitted with close accuracy, and the entire operating mechanism must be erected on a base that will be sturdy enough to maintain alignment and accurate enough in itself to maintain the various sub-assemblies in correct relation to each other.

The base of the machine is machined by milling in an Ingersoll Milling Machine of special design, as shown in Fig. 1. In order to finish the various pads and locating points accurately, seven special inserted-tooth cutters are employed on the top surfaces, two on the left side,

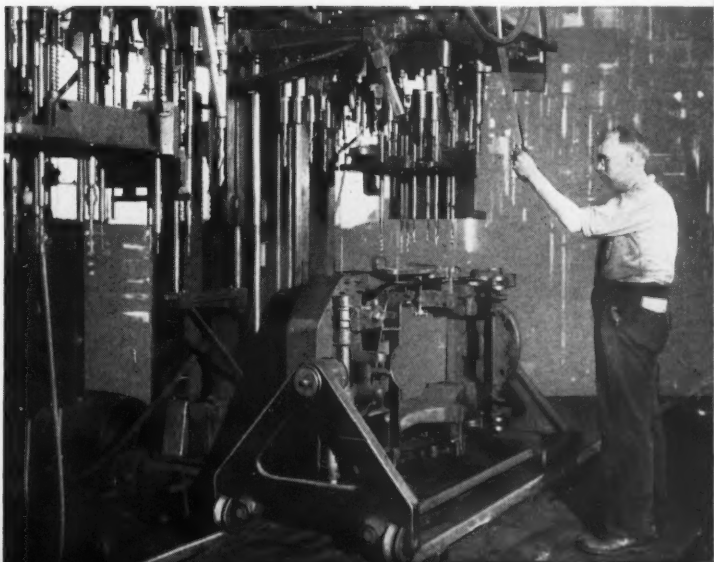


Fig. 3—To Drill All Holes in the Distributor Bracket, the Bracket is Clamped in a Reversible Jig That Travels on a Track

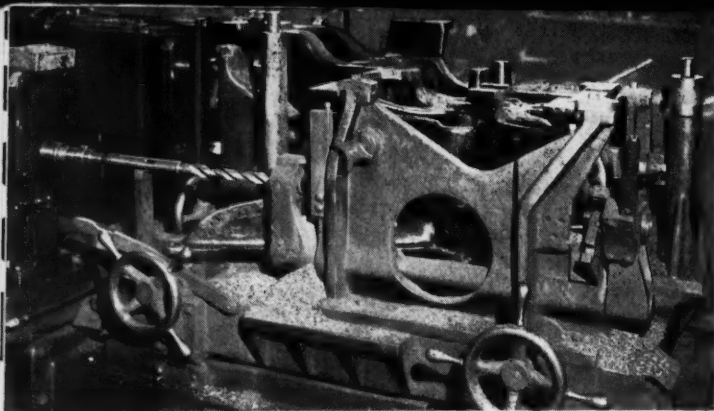


Fig. 4 — Drilling the Large Holes in the Base, Using a Natco Horizontal Drilling Machine

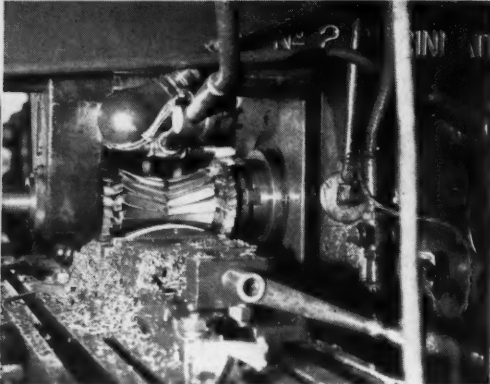


Fig. 5—Milling Form on Mold Cap. The 6.230-In. Radius Must Be Accurate

four on the front, two at right rear, and one at left rear.

In the first operation, feeding left

which the rear head moves in the mill one pad. After all the surfaces have been rough finished, leaving 0.015 in. for the finish cut, the operator releases the tension on all clamps and the operation is repeated. Releasing the clamps releases any distortion that may have been set up in clamping, and the light cut taken in the second milling operation leaves all surfaces accurately finished.

After the milling operations on the base have been completed, the base is clamped in a jig which rides on a track as shown in Fig. 2. This track extends the full length of the line of machines included in the base production line, making it possible to move the base from one operation to the next without undue effort.

In the operation shown in the process in Fig. 6, a Natco multiple spindle drill is used to drill 25 holes in one

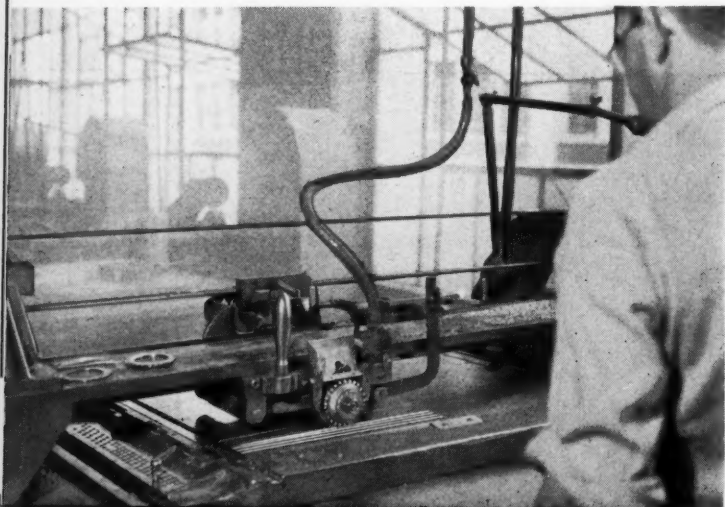
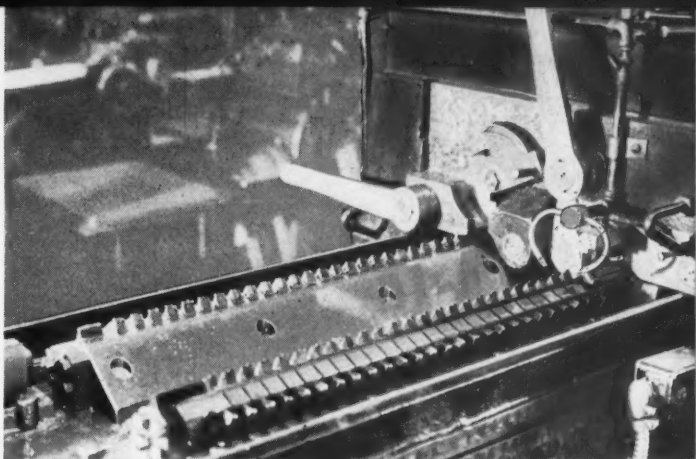


Fig. 6 — Milling Grooves in Magnetic Plate. Grooves Made from Bottom, Necessitating Indexing

Fig. 9 — Bar in

- Drilling the
Holes in the
Using a Natco
Horizontal Drilling
Machine

Fig. 7—Planing Teeth
on Distributor Bar,
Using Hendey Planer
and Special Cutters



side of the base. With the drill spindles properly spaced, accuracy between hole centers is assured by the jig - plate.

After this operation has been completed, the base is moved to a Natco horizontal machine where two 17/32-in. holes and two 1/4-in. holes are drilled, and from this operation to a radial drilling machine where all of the holes are tapped.

The distributor bracket is another part that is too large and heavy for easy handling, and consequently is processed by clamping in a reversible fixture that travels on a track as shown in Fig. 3. Here the fixture is shown tilted sidewise to permit the drilling of five holes in one side. After drilling, the fixture is reversed and three holes are drilled in the opposite side, then the fixture is again swung to bring the bottom surface of the piece to the top and 17 holes are drilled in the bottom. With a jig-plate on each of the three sides, possibility of error is eliminated and all holes are drilled in the correct relation to each other. The piece is then moved on to a radial drill where all holes are tapped.



Fig. 8—Close View of Tools Used to Plane Teeth on Distributor Bar

In the operation shown in Fig. 4 the base is having four holes drilled; two 1 7/32-in. holes and two 1/8-in. holes. For this operation the base is lifted from the track jig by means of an overhead hoist and deposited in a jig on the table of the Natco Horizontal Machine shown in illustra-

— Milling
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Grooves End
Bottom, No
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Fig. 9—Grinding Sides of Distributor Bar in Mattison Surface Grinding Machine



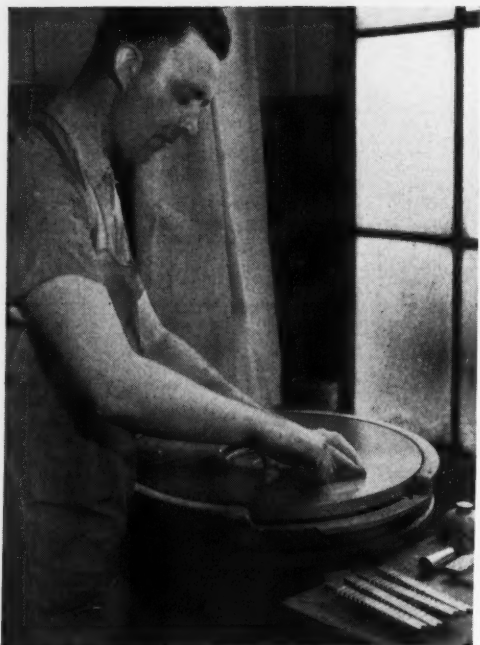


Fig. 10—Lapping Mold Caps, Using a Power-Driven Cast Iron Rotary Lap Containing Circular Grooves to Hold the Lapping Compound

is that of milling the form on a mold cap, for which a form cutter is used in a Cincinnati No. 2 miller. The piece is milled from a solid rectangular block seven inches long, the cutter producing a 6.230-in. radius. The feature of the operation consists in the quality of the job that can be produced with a form cutter and two sets of plain spiral-tooth mills.

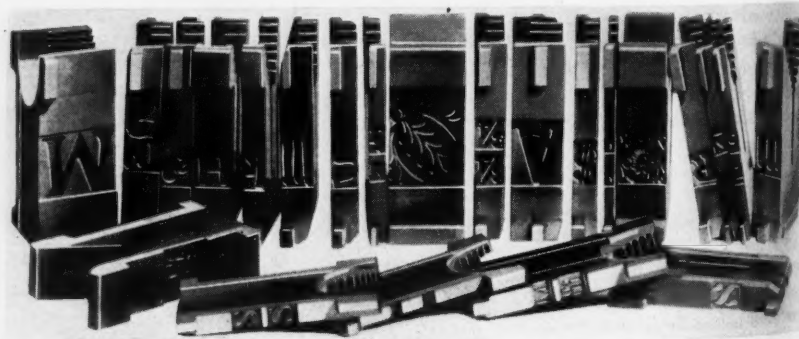
In the process of casting a line of type, the matrices for all of the letters that will be required to make up the line are assembled together to form a single mold. After the line casting has been made, the line of matrices is conveyed to a distributor which drops them into the slots in the magazine from which they were drawn to form the mold. There are as many grooves in the magazine as there are characters in the font of type in use, and the grooves must be

tion. Here it is accurately located by means of locating pins that fit into holes which have been drilled in previous operations. When this operation is completed, the piece is replaced in the track jig.

The operation illustrated in Fig. 5

matrices is conveyed to a distributor which drops them into the slots in the magazine from which they were drawn to form the mold. There are as many grooves in the magazine as there are characters in the font of type in use, and the grooves must be

Fig. 11—Linotype Matrices in which a Variety of Characters Have Been Engraved Including Letters for Foreign Languages and Decorative Designs



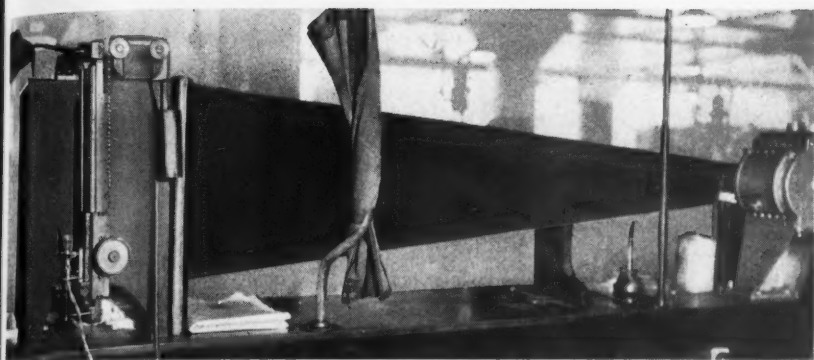


Fig. 12—Comparator in which Matrices are Examined for Accuracy After Character Has Been Cut In with Engraving Machine

milled in the magazine plate with close accuracy. The operation of milling the grooves is shown in process in Fig. 6.

The magazine plate is of plate brass or special aluminum alloy, and the grooves are milled to various widths according to the widths of the various letters. The grooves are not parallel, but radiate from a given point theoretically determined at the bottom, or inner end of the plate. The machine is of special design, built to move on a track so that the cutter and spindle mechanism, which are carried in a carriage as shown, can be fed automatically the length of the plate. Power feed is used to feed the cutter spindle.

The illustration Fig. 7 shows the operation of planing the teeth on a distributor bar, for which a Hendey planer is used. This bar forms the track upon which the matrices ride in traveling back to their locations in the magazine, and the little "steps" on the sides of the bar are duplicated in the V-shaped opening in the end of the matrices. The teeth are first roughed out in a milling operation, then are finished to size and shape by planing in this machine, using special cutters as shown in Fig.

8. The bar is 24 in. long, and a feed of 0.0005 in. is used to obtain the extreme accuracy required.

The sides of the distributor bar are finished by grinding in the Mattison surface grinding machine shown in operation in Fig. 9. The bar is of machine steel, $\frac{1}{2}$ in. thick, and is finish-ground to a thickness of $\frac{7}{16}$ in.,



Fig. 13—Reflected Image of Letter "W." The Character is $\frac{1}{8}$ In. High; the Image on the Screen is 8 In. High

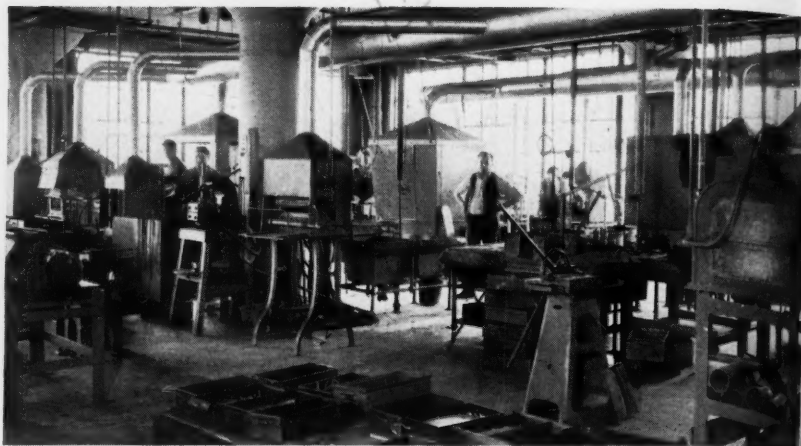


Fig. 14—General View of Heat Treat Department

plus or minus 0.002 in. A three-inch wide wheel is used, with a 1-in. feed. The size and sturdy construction of the machine especially adapt it for the accuracy required on this job.

One of the most interesting parts of the Linotype is the mold, in which the lines of type are cast from molten type metal that is forced into the mold under pressure. To ensure that none of the liquid metal escapes, all contacting faces on the various parts of the mold are lapped to provide for a perfect fit. One of the lapping operations is shown in Fig. 10, where a mechanic can be seen using a rotary lap to lap the contacting surface of a mold cap.

The lap is a circular cast iron plate in the surface of which circular grooves have been cut, and is revolved by a motor which drives the vertical spindle to which the lap is attached. The grooves are intended to prevent the lapping compound from "balling" or being washed off the lap. Several of the mold caps can be seen on the table in the foreground.

In the face of each matrix is a

letter, figure, or other character which has been engraved in the metal by the use of an engraving machine which operates on the planograph principle. A number of matrices engraved with a variety of letters and characters are shown in Fig. 11. After the character has been cut, the matrix is inspected for accuracy by examining it in a comparator such as the one shown in Fig. 12.

The matrix is placed in a suitable holder in this machine and a 12,000 candlepower light is thrown upon the surface containing the engraving, from which the light is reflected, enlarged approximately $62\frac{1}{2}$ times, upon a screen. The enlargement is $1/16$ in. high for each 0.001 in. of actual measurement; thus a character which is actually $\frac{1}{8}$ in. high is enlarged to approximately 8 in. high on the screen, making it easily possible to detect any imperfections. A screen showing a reflection of a matrix face bearing the letter "W" is shown in Fig. 13.

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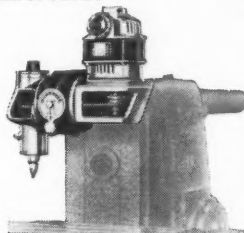
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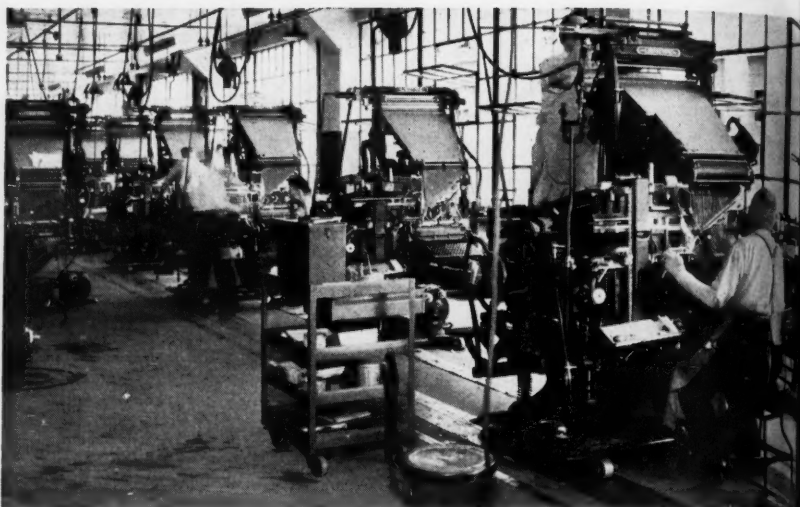


Fig. 15—Final Assembling Department Where the Last Touches are Applied to the Linotype. Each Machine is Carefully Inspected Before Being Approved for Shipment

machine are heat treated in order to develop the necessary qualities of strength, hardness, toughness, or wear resistance. All small parts are case hardened, and larger parts are carburized and quenched. Steel rollers are carburized to provide a case from 0.030 in. to 0.040 in. deep. A general view of the heat treat department is shown in Fig. 14, where every type and kind of heat treating furnace necessary for work of the size manufactured in the Mergenthaler plant will be found.

Figure 15 is a general view of the Linotype assembling department, where the finishing touches are applied to the machine. The men who perform the final assembling operations on these machines, and who "tune" them in for perfect operation after assembling, are men who have been with the firm for many years and thus are acquainted with every detail of the design and manufacture of the machine.

The final assembly operations are

performed on a production line which consists simply of a cable slot in the floor through which power can be applied to move the entire line of machines as fast as finished machines are O.K'd and moved out for shipment. Steel plates are provided on both sides of the cable slot so that the rollers supporting the machines will roll evenly and smoothly. Each machine must perform to the complete satisfaction of the inspectors before it is approved for shipment.

"Speed Case," a low carbon open hearth steel plate for gears, sprockets, wheels, jigs and fixtures, bed plates, composing tables, metal forming rollers and other dies, bearing, bolster, wear and stripper die casting, and so on, is described in a 24-page treatise entitled "The Story of Speed Case," which is now being published by W. J. Holliday & Co., Speed Case Plate Division, Hammond, Ind. "Speed Treat," a medium carbon, open hearth, high tensile, free machining steel is also described. Copy free upon request.

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The Machining of Brass and

By W. M. BALL, JR.*
Foundry Superintendent
The Edna Brass Mfg. Company

Bronze Alloys

THE non-ferrous field is a very large field, covering a large assortment of alloys, I would say, running into the thousands and are generally divided into the white and yellow metals. The white are made up of alloys runnings high in tin, lead, zinc, aluminum, magnesium and beryllium, and so on, but inasmuch as I have had little experience in that field, I will limit my discussion to the yellow metals, known as the brasses and bronzes.

The brasses and bronzes, which are basically copper, are of very early origin and undoubtedly came into general use when man discovered that copper could be worked without a great deal of difficulty. Due to the crude methods used to obtain these materials, and from the analysis of old bronzes, it is evident that the constituents of the alloys were found largely in a free state or in such condition that they could easily be reduced because in the ancient histories pictures are found of primitive blast furnaces, the blast being furnished by slaves blowing through bamboo pipes.

* Presented before the Machinability Group, Cincinnati Chapter, American Society for Metals, and reported exclusively for MODERN MACHINE SHOP.

As man's knowledge of metals progressed and he found a way to add tin, lead, zinc and other elements to copper, he developed a larger number of alloys which opened up many new fields of use along with many problems of alloying, refining, and the one of machining these materials. There was a great deal yet to be learned, and a great deal of research of a primitive type was carried on.

It was at an early period—probably between 200 and 300 B. C.—that the incident occurred of the king who felt that the royal foundryman had cheated him in making his crown and concerning which he gave the job of investigation to Archimedes. History makes quite a story of this incident in that it was the first record of tests being made to determine the composition of metals by weight.

The field of brasses and bronzes includes a large assortment of alloys, and in order that we may have some sort of picture before us to work on so that we can make comparisons between some of these brasses, I have made a partial list of those most generally and commonly used. The first is the high purity copper group; the second, copper-tin, known

as the bronzes; the copper-zinc, which are known as the brasses; followed by copper-lead, copper-nickel, and copper-aluminum and iron, which are closely associated. Thus we have the seven elements; copper, tin, lead, zinc, nickel, aluminum, and iron.

Chemical analyses will form a very important part of our discussion, for it is one of our best methods, after Archimedes, to distinguish these materials one from another. By taking borings of these metals we can tell exactly how much tin, lead, zinc, or other ingredients are included in the mixtures. Science has made it possible to analyze a standard alloy and segregate one element at a time and chart its characteristics.

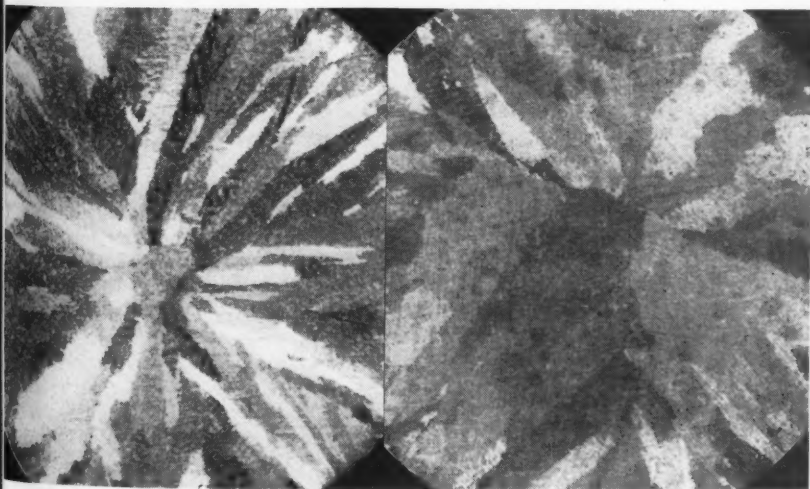
Let me mention a case upon which I happened to be working together with an engineering student. We started with a standard alloy and ran about 200 heats, making the necessary chemical and physical analyses to determine the effect of each added element. When used alone,

each one of these elements has one set of characteristics, but when alloyed, the characteristics change. Both tin and copper are very soft, but when they are mixed they comprise a metal with characteristics entirely different from those of the individual metals.

It is through knowledge of the physical and chemical properties that we are able to determine the characteristics of the different metals and know which will provide the hardness, the brittleness, the malleability, conductivity, and other characteristics in which we are interested. Knowing the metals to alloy in order to obtain the desired characteristics, we are able to produce alloys which will fit the applications for which they are to be used.

Figure 1 shows macrographs of two pieces of the same brass, out of the same furnace, but heat treated differently. Note the effect and entirely different crystallization. These pictures are possible only because of the microscope which enables us to

Fig. 1—Macrographs of two pieces of the same brass, out of the same furnace, but heat treated differently. Note difference in crystallization.



see below the surface of a metal and determine the pattern of crystallization.

Seen through a microscope, some alloyed metals resemble a sponge. The openings in the sponge are filled with the alloying elements. It is not difficult to imagine what the cutting tool will do when passing through the different types of alloys within alloys. The grain structure as shown by the microscope can be governed by the pouring rate and the temperature of the mold into which the metal is being poured. The grain structure will also be influenced by the use of green sand, dry sand, or chill mold as well as by the heat treatment. In some cases the Brinell hardness will change from 110 to 435, which has a very important effect upon machinability.

The first item of importance in the working of the metal is the machine tool upon which the piece is to be processed. It is important that the machine be rigidly set and properly insulated from vibration; otherwise vibrations will register in the machined surface. One machine running alongside of another one which is not properly insulated will reflect the vibrations set up by the second machine and make it impossible to obtain a smooth finish. Then the machine tool must be of rigid design and construction with ability to stand pressure and the load of the cutting tool. Looseness of bearings or parts in the machine tool will also quickly show up in the machining.

Another important item to be considered is the source of power for the machine. It might be recommended that a piece of material should be cut at 1400 r.p.m. and you may find that your machine does not run that fast nor would it be able to carry the load at that speed. Consequently it is important to consider the

power, feed, and speed, all of which must be right for proper machining.

We had a case recently in which we sent some rough castings to a customer, but after a day or so received word from him that the castings were defective. The customer stated that the castings had to be perfect because they came in contact with coloring matter. Upon examining the job, I told the customer that his lathe was the cause of the trouble, in that it ran too slow. I machined two of the castings in a lathe which was built to run at a much higher speed and showed the customer that they machined perfectly at that speed. Speed is an important factor in the machining of brass.

The next item for consideration consists of the small tools that are used on the job. During my experience I have seen high speed tools developed to take the place of carbon steels, followed by sintered carbides. All of these tools have their place in machining brasses and bronzes; there are cases where carbon steel is just as efficient and perhaps even better under some conditions than higher priced steel. However, on rough jobs or on castings where sand may be encountered in the scale, sintered carbides will do the best job.

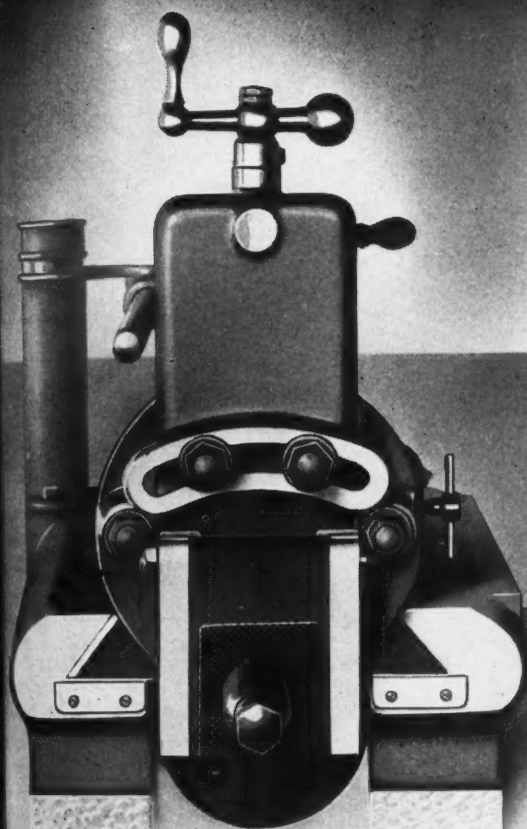
I remember the first sintered carbide tool that was brought into the shop. The salesman found a broken window whereupon he used one of his sintered carbide tools to cut it much as a knife cuts a piece of soft pine. Then the superintendent put the tool into one of the lathes; a lathe upon which we had a very fine operator. The salesman adjusted the tool to suit his idea and told the operator to go ahead. The operator demurred on the ground that the cut was too heavy or the speed too high, but the salesman insisted that he go

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ahead with it so he started the lathe.

Almost immediately the bearings burnt out and everything stopped except the drive pulley. The salesman took his tool and left with the statement that he would come back again when we had a machine capable of handling his material. As a result of that incident, we have since put in several new machines, set up to use sintered carbide tools.

Coolants and lubricants also comprise a factor which has to be taken into consideration in the machining of brasses and bronzes. On some jobs a tool has to be kept flooded in order to obtain the best results,

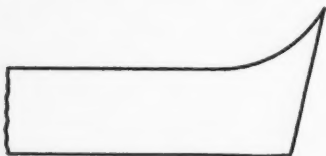


Fig. 2—For turning copper a tool is used which has a built-up edge, extreme cutting rake, and plenty of clearance.

while at other times only a small amount of coolant is needed.

The next item is one which I believe is likely to be overlooked. I can remember the days when an operator had practically to tear a lathe apart to change the feeds and speeds. Now we have the push-button type of controls where the operator controls the speeds, feeds, and table movements by the use of buttons, with indicators to tell him what is happening on the inside of the machine.

Be sure that the operator knows his business. There are often cases in which an untrained man is put on a machine, the idea being that the fixtures will take care of the accuracy. I do not agree with that policy, as the machine tools of today are much more complicated and

more expensive and the cutting tools and fixtures are more costly and require more care in handling. Today we are working for finer finishes and closer tolerances and I want to be included among those who believe in having better trained operators for better equipment.

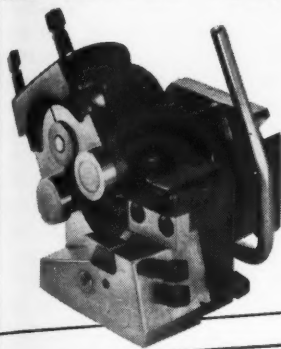
In an analysis of a brass or bronze alloy many elements are found which are considered as impurities. We will consider these alloys as simply binary and ternary and will consider here only the main constituents.

One of the primary problems of machining brass or bronze is the difficulty of holding the material. In the high-purity copper group, particularly, much difficulty is encountered in holding the material, due to its extreme softness. This is assuming that the copper is in the neighborhood of 99½ per cent pure with a tensile strength of approximately 25,000 lb. per square inch and an elongation of about 50 to 60 per cent. The majority of castings including such a high percentage of copper are used because of their electrical and thermal conduction properties, and a minimum of other elements are used in the alloy because the addition of other elements reduces the conductivity. However, in order to cast and work copper it is necessary that a small percentage of silicon, phosphorus, calcium, magnesium, or other element be added in small quantities to eliminate the dissolved impurities and make the alloy workable.

Pure copper is very ductile and malleable, and for the machining of pure copper it is customary to use a tool with a built-up edge. This tool has an extreme cutting rake and plenty of clearance, and by taking light cuts at high speeds it is possible to do a nice job of turning without the use of either coolant or lu-

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1371	No. 2	1" "	3/4	1/8
1372	Nos. 2, 3, 4	Flange	1	1/4
1373	Nos. 3, 4, 5, 6	"	1 1/2	3/8
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bricant. When tapping or threading soft copper alloys, however, it is in some cases necessary to use a lubricant and possibly a succession of dies or taps in order to obtain a good, smooth thread.

In this same group we find a slightly different alloy in which is included approximately 1 per cent of such elements as chromium, tungsten, or molybdenum. These elements have the property of greatly hardening the copper without reducing its high conductivity, consequently this alloy is used in welding equipment and where high compression strength is required. The elongation of this alloy drops rapidly as the tensile strength increases, consequently in machining this alloy the shape of the tool will have to be changed somewhat. Due to the ad-

ditional strength of the alloy it would be impossible to use a tool with extreme rake, although some of the positive cutting rake should be retained as shown in Fig. 4. Coolant will be found helpful in the machining of the tougher and harder high purity alloys.

In the next group will be found an alloy with which we are most familiar—the copper-tin alloy. The tin is added to the copper to increase its hardness. We find these alloys ranging from very soft through very rough alloys to very brittle alloys; the elongation dropping rapidly from 50 or 60 per cent to 0, which certainly indicates brittleness. As the alloys increase in hardness, the tensile strength goes up from 25,000 to 45,000 lb. and then quickly drops

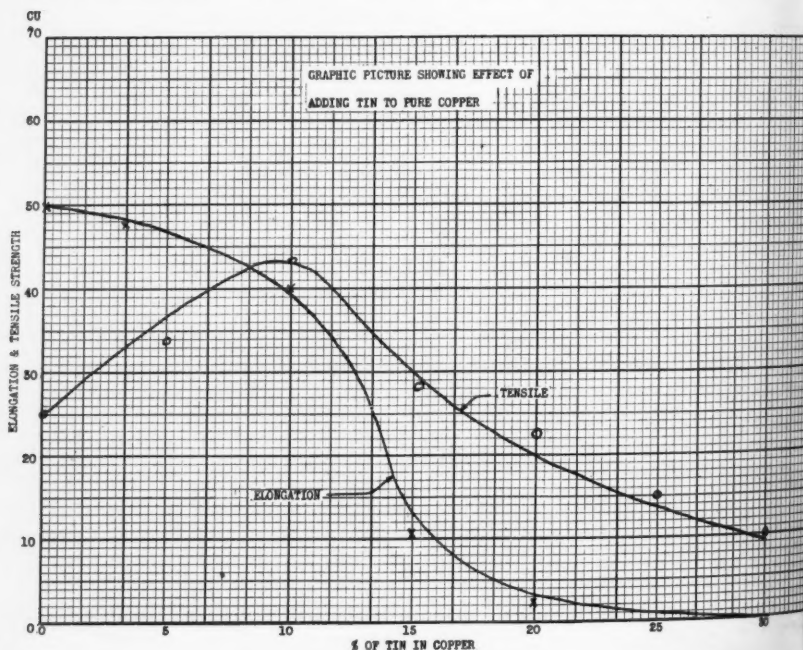


Fig. 3—Chart Illustrating Effect of Adding Tin to Copper

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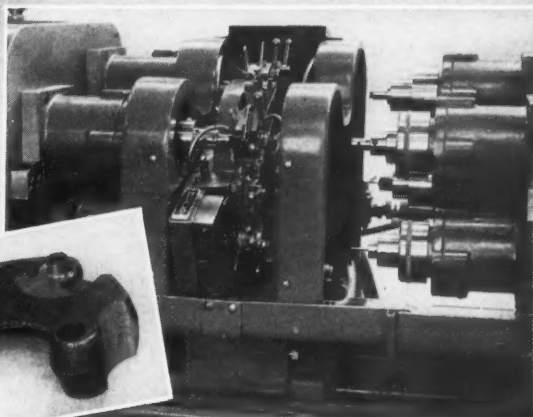
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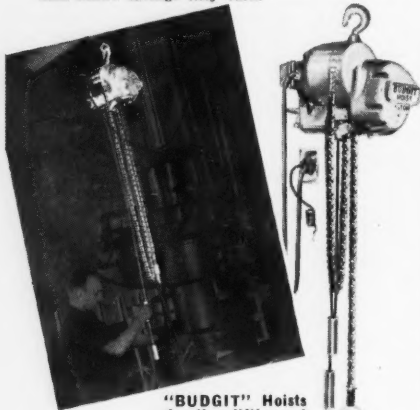
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a point which indicates a very weak alloy. The curves on the chart Fig. 3 show the elongation and tensile strength in their relationship to the amount of tin included in the alloy. While I cannot vouch for the complete accuracy of the chart, it is a good picture of the effect of the addition of tin to copper.

When we come to the machining of these copper-tin alloys, we find that with the addition of perhaps 5 to 10 per cent of tin we have retained a lot of the softness of the copper although the hardness in-

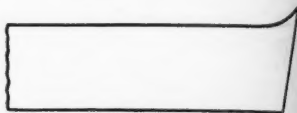


Fig. 4—For machining hard copper alloys, the tool should have very little cutting rake. As alloys are added and the metal becomes more brittle, less rake is used until, for brass, the tool has no rake at all.

parted by the tin is beginning to show. This alloy will be quite difficult to cut and will require a tool with quite a lot of rake. The use of coolant will be necessary to keep the temperature of the material down. However, with the further addition of tin, the alloy loses most of the ductility and becomes very brittle. To machine this material the tool should be changed for one having no rake at all and ground similar to a tool which would be used for cast iron. It will not be necessary to use either a coolant or a lubricant.

Considering that we are discussing this alloy as a binary alloy only of the tin and copper components, I might say that where the specifications permit the addition of other elements, we are adding small amounts of lead, up to 2 per cent, and also zinc, as an aid in the machining of these copper-tin alloys.

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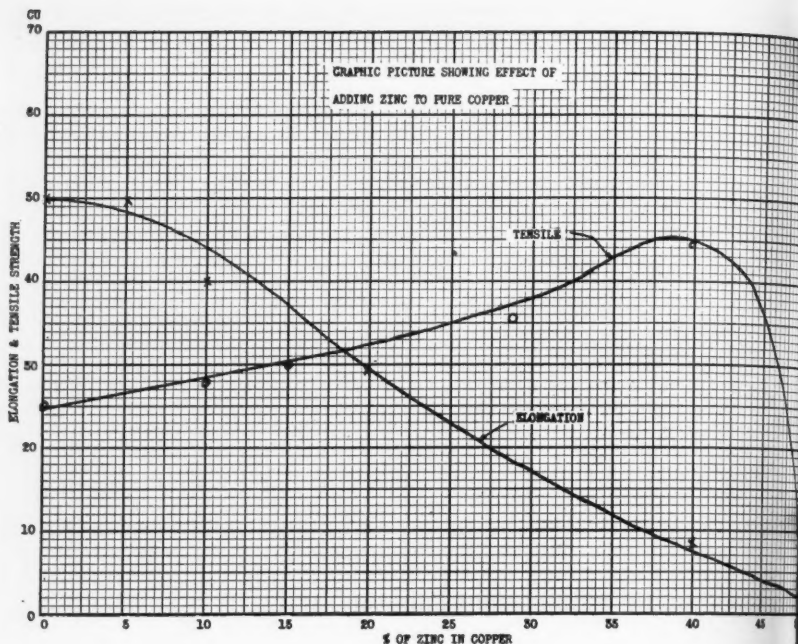


Fig. 5—Chart illustrating Effect of Adding Zinc to Copper

We find that these small additions of both lead and zinc do not materially change the physical properties and therefore it is possible to meet the physical specifications with these additional elements.

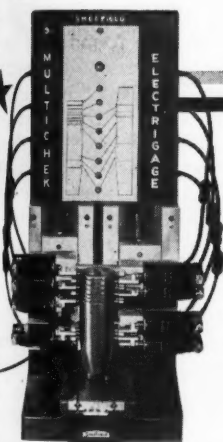
In the next group, which is the copper-zinc group and is therefore one of the brasses, zinc is now being added in many combinations and for two reasons. First, to harden the copper, and second, because of the cheapness of the alloy. The condition is the same here as that which obtained for the copper-tin group; the zinc is added for hardening purposes, but due to the fact that tin costs somewhere between 45 and 50 cents a pound and zinc costs only approximately 5 cents a pound, it is more economical to use zinc to

harden the copper instead of tin, if possible. The effect of adding zinc to pure copper is illustrated in the chart Fig. 5.

Upon observing the elongation and tensile strength curve of the zinc alloys it will be found that the zinc imparts the same characteristics but at a much slower rate than the tin. It will be found that elongation approaches zero when twice the amount of zinc has been added as of tin, and that the tensile strength goes up much slower than in the case of the tin. However, zinc is the one element that imparts the best machining characteristics to the alloys. We are able to machine these alloys at very high speeds and feeds without the aid of coolants or lubricants. Tooling is very simple, the tools



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ing of normal design with but slight rake and clearances. Many of the rolled brasses fall in this copper-zinc group and we seldom have any difficulty in machining these alloys.

The next group is the copper-lead group, which will be found somewhat different from the previous groups in that copper and lead are seldom found running alone. This alloy is now changing to a ternary alloy. In this alloy we generally find a third element present. The copper and lead do not enter into solution very well and inasmuch as the solubility of lead in copper is about 2 per cent, in most cases tin is added as a third component. The alloy thus produced has very high anti-friction characteristics, and is therefore most generally used as a bearing metal.

Inasmuch as lead is very soft and easy to cut, it might be thought that these same characteristics would apply to this alloy, which is not true. I mentioned earlier in this paper that the structure of this alloy resembles that of a sponge, the copper representing the matrix of the alloy with the holes filled up with free particles of lead and lead-tin metals. Due to the slippery quality of the lead, some difficulty is encountered because of the tendency of the tool to cut into these soft materials and then ride high over the harder materials, producing a rough surface. It will also be found that the tool has a tendency to back away from the material in machining if the machine is not absolutely rigid.

These alloys are of the weaker type and generally have tensile strengths ranging from about 22,000 to 30,000 lb. with elongations of between 6 and 15 per cent. Due to the weakness of the alloy and the type of grain structure, it will be found necessary to use a tool with a very keen edge and to cut the metal at

high speeds with light cuts to obtain the best finish. The rake of the tool can be zero or slightly negative in order to offset the tendency of the tool to gouge in if it has too much rake.

The same condition that was found with the copper-lead group is found in the copper-nickel group, in that copper-nickels are seldom found running alone. I know of no commercial alloy, unless it is a very special one, where copper-nickel is found by itself; a third major element will usually be found present.

There are two important groups within this group; the copper-nickel-tin group and the copper-nickel-zinc group, and it will be found that they have entirely different machining characteristics. In the first group two of the elements will now present characteristics which are tough to handle, the tin imparting toughness and hardness and the nickel showing characteristics of tenacity, stickiness, and increasing tensile strength with a tendency to gall and build up on the point of the tool. Two alloys, one of the copper-tin and the other of copper-nickel-tin, may meet the same specifications, but the alloy with the nickel content will require a coolant for machining. Another thing; nickel alloys have to be cut, consequently the tool will have to be ground with positive rake and clearance in order to cut this metal.

In the next part of this group we find zinc present and inasmuch as I mentioned previously that zinc is one of our best friends for machinability, we are now substituting zinc for tin, leaving only a small percentage of tin in the alloy. With the zinc content increased to 10 per cent and the nickel to 20 per cent, it would be expected that it would be more difficult to machine. On the contrary, due to the presence of the zinc, we find that

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this alloy cuts very easily.

For the machining of this type of nickel alloys, it is necessary to use only simple tools such as are used in machining ordinary soft zinc-bronzes, which can be cut with a tool ground at a straight angle and at fairly good speeds. The alloy has a higher tensile strength than some and will need more power for machining.

In the next group, which is the copper-aluminum and copper-aluminum-iron group, we will find the same thing happening that we found with the tin. We are swapping softness for hardness and with that we are sacrificing the nicety which was present in the case of the zinc-copper-tin alloy. The tin would not be so bad, but in this group we are getting into the aluminum characteristics of galling and stringiness with increasing hardness. As we increase past 10 per cent of aluminum we find that wrought iron is being added—which means more trouble—and we are obtaining alloys of 89-10-1, the 1 being iron. The tensile strength of these alloys has now changed from our original 25,000 and 30,000 lb. up to 100,000 lb. with elongation and reduction of area from 0 to 4, comprising a very tough and on up into a very hard alloy.

In machining these copper-aluminum alloys, in most cases it is found best to use a coolant. In testing for tensile strength, for example, if a test bar were used that had a 1 in. square cross section and a tensile strength of 110,000 lb., the test machine might be injured. It may be best to make a small test bar, dropping it to half size. If the tensile strength is still high, it could be dropped down to 1/10 or 1/20 size. As zero is approached, eventually it would be possible to break the test bar with the hand. This is a good indication of the machining characteristics of the

types of alloys which have 100,000 lb. tensile strength. It is not so much a case of cutting as of scraping.

It has been my experience that when machining such an alloy, with high tensile strength and brittle characteristics, the tool should be ground so that it just scrapes the metal. If one were trying to cut a square thread on such an alloy, the cutting would have to be done in light stages, using a tool with plenty of clearance so that there would be no rubbing. The tool should cut with a scraping action, clean and clear, and with proper lubrication. In tapping a hole in this alloy it is impossible to complete the thread with one tap; a series will have to be used. When a single tap is used, it pushes rather than cuts the metal.

In the tougher alloys where the tensile strengths are up around 60,000 to 70,000 lb. while still retaining a 20 per cent elongation, lipped tools should be used and they will have to cut—not push—the metal. The tools should have plenty of clearance and lubrication. On a job of machining chilled aluminum bronze at the Ford plant, so much coolant is used that the work is completely flooded. They use plenty of power and lubrication with a very light cut. The tensile strength of the cut must naturally be less than the strength of the tooth on the tap; if the torque exerted on the tap is greater than the tensile strength of the metal, the tap will be broken.

In conclusion, I will present four examples of alloys to substantiate my theory that it is possible to determine the best method of machining a brass or bronze from the chemical as well as the physical characteristics. The first is a manganese bronze containing an approximate mixture of 58 per cent copper, 40 per

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cent zinc, and 2 per cent hardener, although you will find many other specifications for this alloy. This one has an approximate tensile strength of 75,000 lb. and elongation of 20 per cent.

Another one is aluminum bronze of 89 per cent copper, 10 per cent aluminum, and 1 per cent iron, with practically the same physical properties. In these two alloys we have approximately the same physical properties, but due to the difference in chemical construction we find very different machining properties so it will be necessary to examine the chemical analyses. Observe that one alloy contains 40 per cent of zinc and no aluminum while the other contains 10 per cent of aluminum and no zinc, which indicates that the zinc alloy will have good machining properties while the reverse is true of the alloy containing the aluminum.

In the second example we have two alloys with an approximate mixture of 88 per cent copper, 10 per cent tin, and 2 per cent zinc in the one and 88 per cent copper, 5 per cent tin, 5 per cent nickel, 2 per cent zinc in the other, although they are made practically to the same physical specifications. They will have the same physical characteristics and yet will be absolutely different in their machining properties. One is free from nickel and the other contains 5 per cent nickel. Due to the presence of the nickel it will be necessary to use a coolant and the tools will have to be ground with more clearance and rake than is necessary for the tin-bronze series.

In the next example we have an alloy of 80 per cent copper, 10 per cent tin, and 10 per cent lead (bearing metal) in the one and 88 per cent copper, 10 per cent tin, and 2 per cent zinc (bronze) in the other. The chemical analyses of these two alloys

are different, with different physical characteristics. The bearing metal has tensile strength of 33,000 lb. with 10 per cent elongation and 60 Brinell hardness. The bronze has 43,000 lb. tensile strength with 30 per cent elongation, also 60 Brinell hardness. Note that the hardness is the same although they will be found entirely different in machining characteristics. This example brings out the fact that hardness does not always indicate a definite machining condition, because in one case the Brinell machine is registering toughness and in the other case brittleness.

The last example consists of alloys with 84 per cent copper, 5 per cent tin, 9 per cent nickel, and 2 per cent zinc in the one and 63 per cent copper, 4 per cent tin, 3 per cent lead, 20 per cent nickel, and 10 per cent zinc in the other. In the first case we have a tremendously tough alloy and one that is difficult to machine while the other one, with more strength, machines much better due to the fact that the zinc provides free machining characteristics.

From the above examples, the value of chemical analyses and a knowledge of the machining characteristics of the alloying elements cannot be overestimated.

Norton Cut-Off Wheels. In this 32-page illustrated and descriptive booklet, publication of the Norton Company, Worcester, Mass., Norton Abrasive Cut-Off Wheels for use in cutting a wide variety of metallic as well as non-metallic materials are covered in detail. Copy free upon request.

The Hevi Duty Carburizer. A 24-page bulletin designated as the HD-940 and featuring the Hevi Duty Carburizer is now being distributed by the Hevi Duty Electric Co., Milwaukee, Wis. The construction, operation, uses and advantages of this electric unit are discussed in detail. In addition, complete specifications are listed. Copy of Bulletin HD-940 free upon request.

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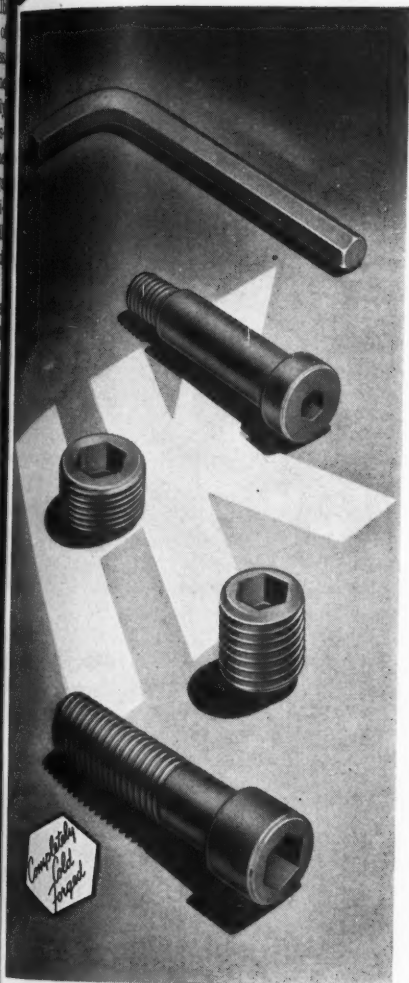
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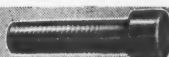
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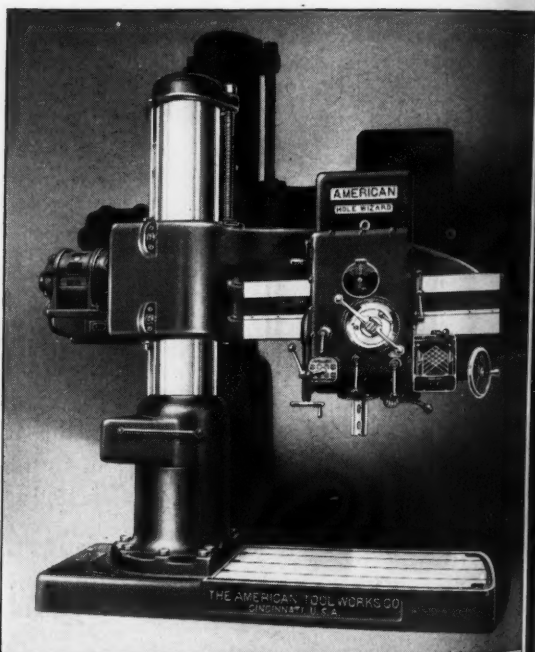
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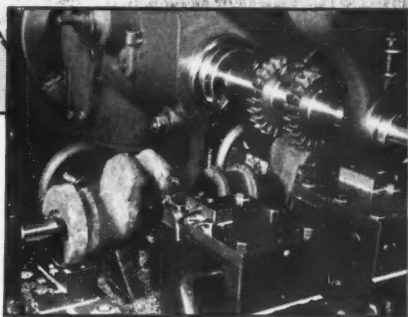
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* Catalog K describes Barber-Colman "Paraform" Cutters, Hobs, and Reamers. It's full of useful information on gears, splines, cutter sharpening, and other subjects. If you haven't received a copy, write today, giving the name of your company and your title.

At right: B-C standard "Paraform" Side Mill. See page 74 in Catalog K.



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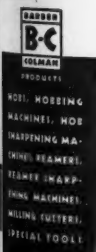
QUICK FACTS

Name of Part — Tractor crankshaft.
Material — MD 1045 Special Steel; forged.
Operation — Mill locating pads on crankshaft.
Machine — Sundstrand Rigidmil.
Cutters — Two Barber-Colman "Paraform" Side Mills, 5" dia. x 7/8" face, with 1 1/2" hole.
Depth of Cut — 3/8".

Holding — Between centers in special fixture. Crank throws are set by dial indicator from fixture.

Feed — 5 1/4" a minute. Speed — 40 r.p.m.
Production — 4.48 minutes floor-to-floor, milling pads on four cranks. Net output, 84.7 pieces each 8-hour shift.

Pieces per Grind — Approximately 423 pieces per grind.



Barber-Colman Company

General Offices and Plant 207 Loomis St., Rockford, Illinois, U. S. A.

Quick-Change Milling Tools for the Bench Lathe

By WALTER G. PORTER

General Manager, Porter Machine Company

EXPERIENCED mechanics will usually agree that the precision bench lathe is one of the handiest machines in any shop. However, while the bench lathe is generally considered a prime necessity for tool or maintenance work, but little consideration is given to it for produc-

tion purposes. In contrast to this attitude toward the bench lathe, the writer wishes to point out some of the advantages possible in the use of the bench lathe for milling small work on a production basis.

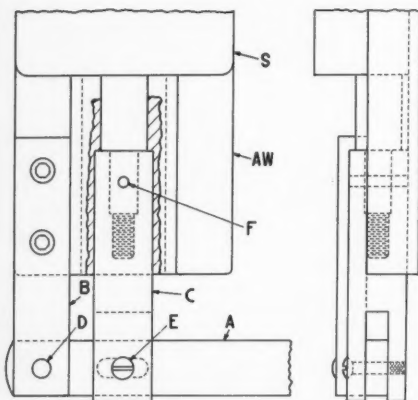


Fig. 1—Drawing of Lever Mechanism for Operating Cross Slide

tion purposes. In contrast to this attitude toward the bench lathe, the writer wishes to point out some of the advantages possible in the use of the bench lathe for milling small work on a production basis.

In practically every screw machine products plant or department one or more hand milling machines will be

found used to perform the small, light milling operations so often necessary on the small parts that constitute the greater part of screw machine production. And it often happens that several of the jobs in process will require milling operations, which results in tying up all of the milling machines. As a rule, some of the jobs will lie until a hand miller is available, which results in delays and correspondingly higher manufacturing costs.

It is at once apparent that if some other available machine could be adapted for milling, production could be expedited, better service could be rendered to the customer, and lower costs could be obtained. Inasmuch as small lathes of the bench type are also found in most of these shops, an important advantage could be gained if the lathe could be converted temporarily into a milling machine, excepting for the fact that some of the time gained would be lost in converting the lathe for milling purposes in addition to which the lathe would be out of commission for lathe work.

With the points outlined above in mind, the writer designed a small, efficient device by the use of which a small lathe can be converted for production milling without having to tear the lathe apart.

As the first step, we designed a lever-action device to replace the slower and quite unwieldy cross-feed

screw on the apron. The device consists essentially of three pieces of steel, indicated in Fig. 1 as A, B, and C. The part A is a lever-handle, attached to the flat top of the carriage by the piece B so that the piece C can be moved in and out as required to feed the cross slide tool. The cross slide is indicated at S, and AW is the carriage way. D is a hinge-pin and E is a connecting pin that is anchored solidly in the piece C but with clearance provided so that it can slide in the slot in the lever-arm A.

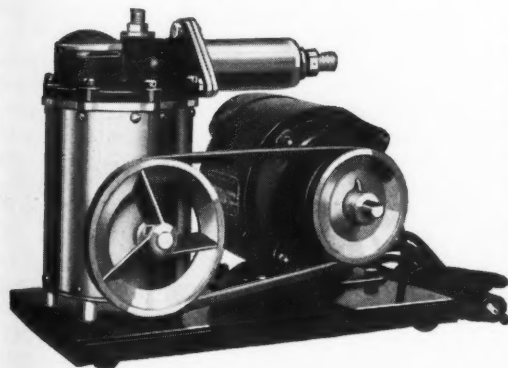
The lever-arm A has a handle on the end, not shown. Part B is simply a flat piece of steel, and part C, which we will call the pusher, is a piece of round steel stock, slotted at the outer end to provide a bearing for the lever-arm, and bored, counter-bored, and tapped at the inner end to fit onto the end of the cross slide screw. The pusher C is locked to the

cross slide screw by means of a $\frac{1}{8}$ -in. diameter steel pin F.

Assuming that the milling cutter arbor is to be held in the headstock spindle of the lathe, the lever-arm attachment converts the cross slide into a table upon which work can be held for processing. However, it is apparent that adequate means must be provided to hold the work in position. Since space will not permit describing a wide variety of the fixtures that can be used in such a setup, two fixtures which can easily be adapted to a wide range of operations will be described here in detail.

In Fig. 2 is shown an assembly view of a fixture that was designed for use in milling a single flat to a given length on the end of a piece of round brass. The brass shaft was $\frac{1}{4}$ in. diameter and 3 in. long, and the flat was to be milled $\frac{1}{8}$ in. long and $\frac{3}{64}$ in. deep on the end only.

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As can be seen from the drawing, the fixture is of simple design, consisting primarily of two plates **G** and **H** hinged together to form a clamp in which the workpiece can be gripped for a distance of about 2 inches. The gripping pressure is ample to ensure against any possibil-

to fit squarely around each workpiece.

The lower plate, **H**, is solidly anchored to the tool post pad by two hollow-head capscrews for which counterbored holes are provided in the plate, the screws threading into a bottom plate **K** under the T-

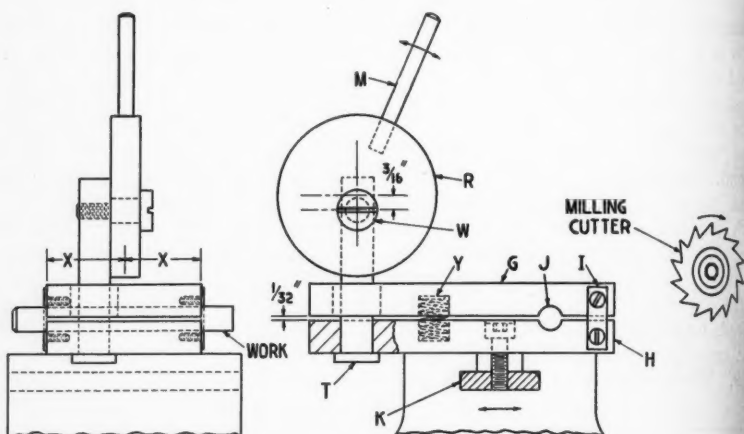


Fig. 2—Assembly Drawing of Cross Slide Fixture for Milling Flat on a Shaft Section

ity of the work revolving within the fixture after clamping. Considering that the seat in which the work is gripped is close to the hinge, a tremendous ratio of force can be exerted by the clamp. Before drilling and boring or reaming the hole **J** for the workpieces, a slab of flat steel stock $\frac{1}{8}$ in. thick is clamped between the plates so that when the upper plate is tightened down on a piece of work, the undersize hole will provide the necessary gripping force.

The hinges with which the plates **G** and **H** are fastened together are simply two short pieces of flat steel **I**, each piece with two holes through which screws can be inserted to thread into tapped holes in the sides of the plates. This method of hinging makes it possible for the plates

ledge. The upper plate, **G**, is movable so that it can be raised to insert and remove the workpieces.

It might be well to emphasize here that any extra effort to ensure the accuracy of the seat provided for the work will pay dividends in the long run by providing a gripping radius which will be exact and which will hold the work solidly. In fact, it is best to center the hole with a center drill and then start with a comparatively small drill, increasing the size of the drills up to reaming size.

The clamp is of the cam-action type, consisting of the roller **R** carrying the handle **M** and mounted on the stud **T**. The roller is merely a solid disc of machine steel, $\frac{3}{8}$ -in. thick, with a hole drilled through it at a point approximately $\frac{1}{4}$ in. of

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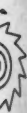
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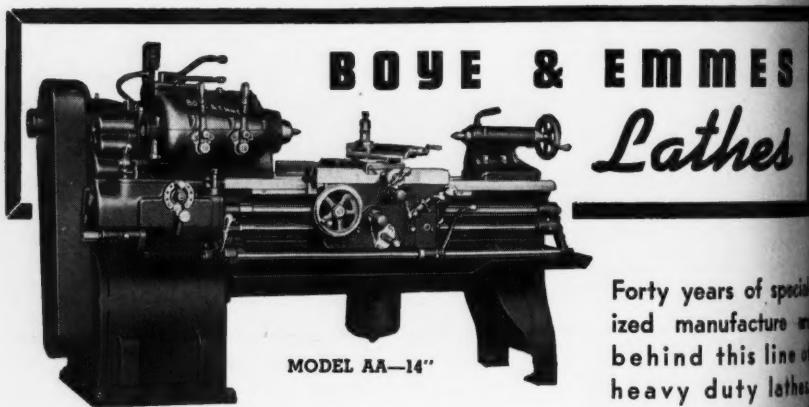
center to receive the stud **W** by which it is pinned to the stud **T**. The handle, **M**, is a piece of 5/16-in. solid rolled steel, threaded on one end so that it can be screwed into a corresponding tapped hole in the periphery of the roller. It must, however, extend from the point farthest from the center stud hole, as shown.

The stud **T** is a straight stud of sufficient length to make possible the mounting of the roller at an effective height above the top plate **G**; that is, so that when the handle **M** is moved to the perpendicular position, the eccentric portion of the roller will have locked the upper plate **G** down against the workpiece. Thus when the handle is swung down to a position somewhat below the horizontal, the pressure against the upper plate will be released, allowing the plate to be lifted enough to make possible the changing of workpieces.

The stud should be centralized so that the distances **X** — **X** will be the same.

The stud **T** is press-fitted into a hole in the bottom plate **H** and extends upward through a clearance hole in the upper plate **G**. The stud **W** should be of a size that will provide the necessary strength, and should have a shoulder upon which the roller **R** can revolve freely. A head on the stud will keep the roller from working off. A compression spring **Y** can be used to raise the upper plate upon release and hold it up while the parts are being changed. A stop, not shown, can also be used to locate the workpieces at a given point in the fixture.

The fixture illustrated in Fig. 3 is one that was designed for the milling of slots in the ends of screws and similar parts. The design is simple, and the fixture can be made in three



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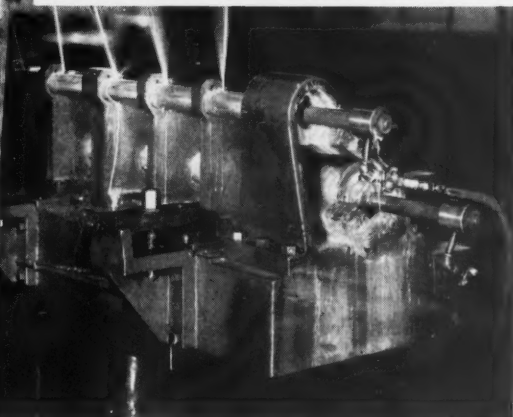
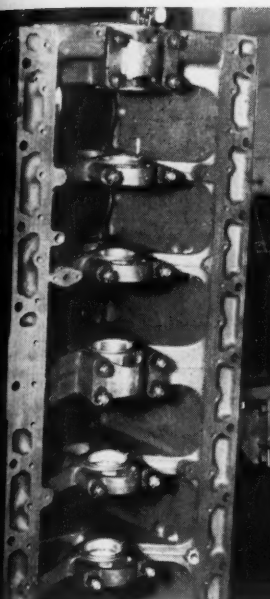
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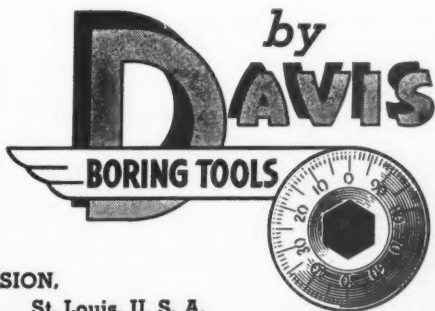
These special Davis boring bars were made of a high carbon, chrome-nickel steel, heat-treated for toughness, and they incorporate hardened tool steel wear strips for piloting. Round tool bits were also used in this set-up to finish bore babbitt.

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The part A is a piece of square steel in which a Vee has been milled to provide a locating position for the workpiece—in this case a needle valve, indicated as N. The operation is that of milling a small screwdriver slot, which is to be 0.035 in. wide by

in position by the two capscrews. The tool from which this drawing was made has a small hole to receive the point of the needle-valve, but in any adjustment were anticipated, this hole could be tapped and screw threaded in, the workpiece to be located by pushing the end of the piece

against the end of the screw. The work is clamped in position by means of the screw S, if clamping is necessary but as a rule it will not be necessary to clamp the work. The screw will, however, hold it from tipping up as the milling cutter starts to cut into the opposite end.

When a cut has been completed, the slide is backed away sufficiently to enable the operator to remove the finished piece and put in a new one. This fixture is simple to make and will

make possible a good rate of production after the operator has become accustomed to using it.

The writer has omitted the arbor for holding the cutter since this part is simple and need consist only of a tapered shank which will fit securely into the lathe headstock. The shank should fit the hole in the cutter, but the cutter should be keyed on, and can be held in place by means of a washer and screw.

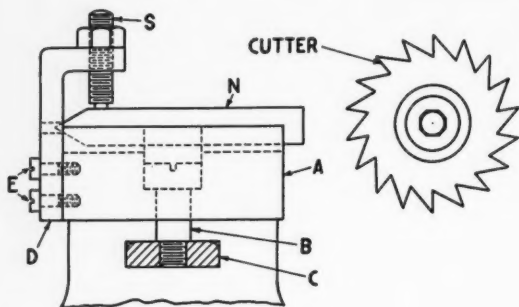


Fig. 3—Simple Cross Slide Fixture for Milling Slots in Screws and Similar Parts

0.0625 in. deep. The steel block is held to the tool slide by the hollow head capscrew B, which projects down through a counterbored hole in the center of the block and is threaded into a tapped hole in the plate C located in the T-slot of the toolpost mounting.

The part D is a stop for properly locating the workpiece. The stop is a piece of machine steel that is bent at right angles as shown and is held



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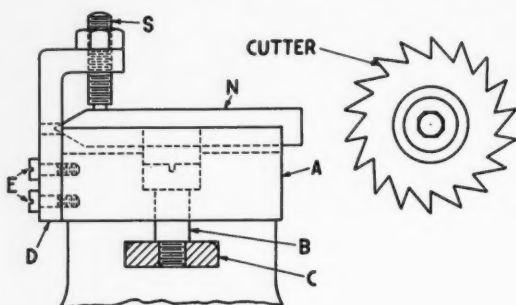
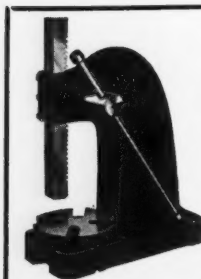


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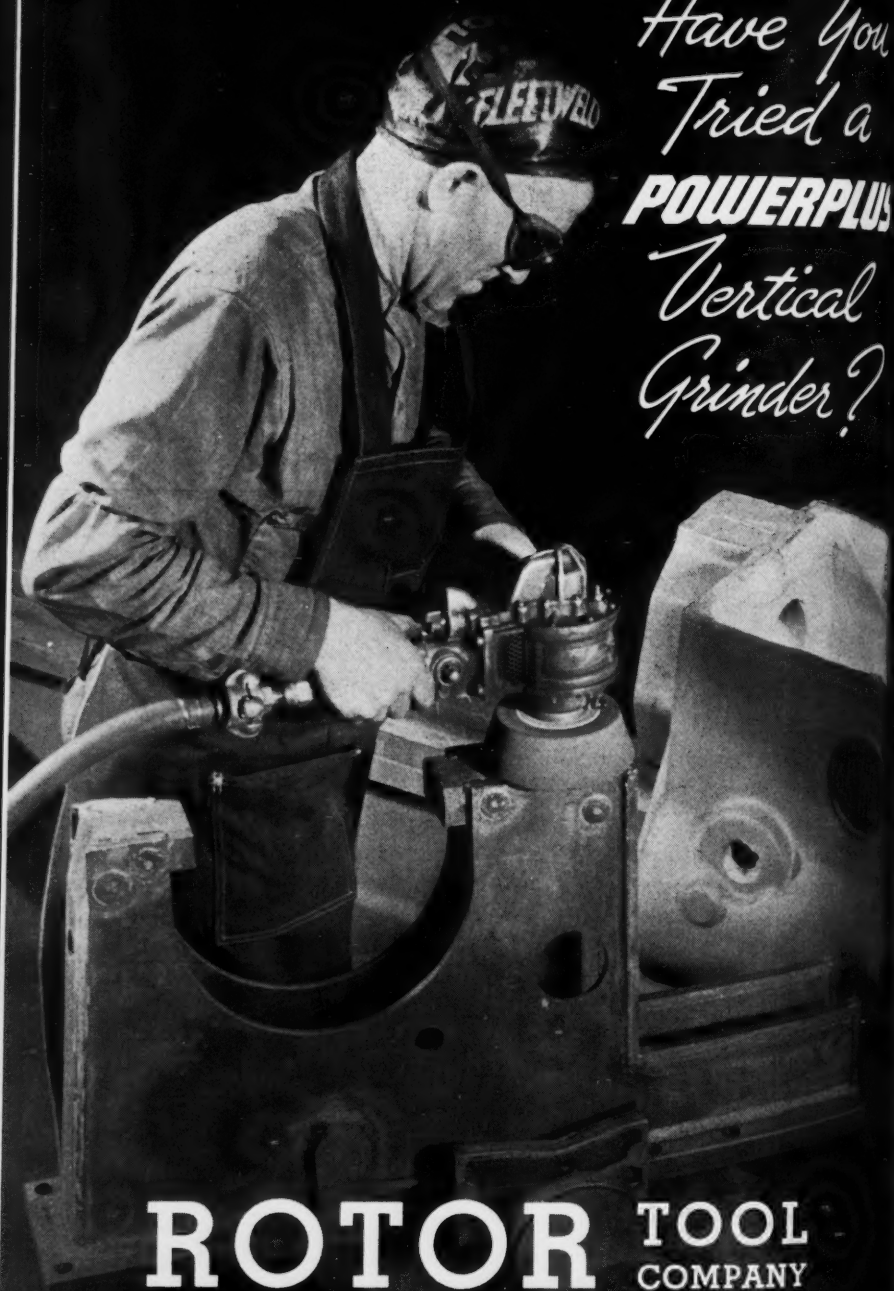
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The General-Purpose Use of Carbide Tools, V

Selection of Speeds and Feeds

By JAMES R. LONGWELL

Chief Engineer, Carbology Company, Inc.
Detroit, Michigan

Two of the principal benefits available through the use of carbide tools are production increase with resultant lower machining cost per piece, and the increase in machine capacity. The two factors responsible for these benefits are (1) more continuous operation through longer tool life, and (2) faster output through higher speeds.

On straight-line, quantity production applications both of these factors can be employed to maximum advantage. However, on small-lot applications embodying but a relatively few pieces per each lot machined, the relative values of these two factors are changed considerably. On small-lot work, except in the case of difficult jobs or jobs involving a large amount of machining per piece, the factor of longer tool life does not have an importance or value comparable to its benefits on quantity production work. Therefore, the shop using carbide tools for general purpose use should strive for all possible savings which can be obtained from an upward adjustment in machining speeds. However, let me hasten to dispel the all too common feeling that this automatically eliminates shops having old equipment.

To achieve success in a general purpose carbide tool program, it is not necessary to make spectacular increases in machining speeds to a point that obviously would be beyond the ability of older types of machines. In a shop-wide, general-purpose carbide tool program, the benefit lies in the net overall savings made, and for this purpose satisfactory savings often result from very conservative (refer to tables) speed increases, usually within the practical range of all but the most antiquated equipment. Examples of economical speeds with carbide are given in Table I. More extensive data of the type shown is available.

The suggested procedure for plants where it is planned to introduce the general-purpose use of carbides is as follows:

1. Review representative jobs that have passed through the shop.
2. Classify these by general types of materials.
3. For initial applications, establish a standard speed increase for each general class of work. Make this a very conservative increase and include as broad a range of work as possible. Table I indicates the type of technical

data that is available to assist in establishing these speeds.

4. As the shop becomes accustomed to the general-purpose use of carbides, adjust speeds further upward where practical and desirable.

By means of this procedure, many of the difficulties often encountered when speeds are drastically increased can be eliminated and the entire program introduced smoothly and effectively. A conservative initial speed increase also tends to lessen the burden of introductory work necessary on each application and in many cases permits broad usage of carbide tools within a relatively short period. Drastic speed increases at the outset of the program naturally add con-

siderably to the amount of time that will have to be spent on each individual job tooled up. In contrast to this, a conservative increase makes the initial application simpler and permits coverage of a larger number of jobs within a given period of time.

An example of the extreme worthwhile benefits that can be obtained by a conservative approach to the general-purpose use of carbide is to be found in the Warner & Swasey plant in Cleveland. To date, carbide general-purpose tools have been applied to approximately 1,500 small lot diversified machining applications (40 per cent of which are steady cutting applications). Net overall result has been an average increase

43 per cent in machine capacity on these jobs. Table I contains a representative cross-section of these applications.

The success of this installation indicates that it is unnecessary to use the sensational speed commonly associated with

PART	METAL*	OPERATION	SPEED (S.F.P.M.)	FEED (Per Rev.)
Friction Sleeve	Cast Iron	Rough Face	214	.0115"
		Rough Bore	171	.0167"
		Turn	214	.0167"
		Rough Bore	171	.0167"
		Fin. Turn	214	.0167"
		Form Slot	162	.0045"
		Fin. Face	295	.0115"
Face Plate	Cast Iron	Rough Face	231	.0150"
		Rough Face	231	.0150"
		Rough Face	177	.0115"
		Rough Bore	132	.0124"
		Rough Face	184	.0062"
		Rough Bore	157	.0124"
		Form Clearance	69	.0124"
		Rough Face	148	.0062"
		Rough Turn	255	.007"
Bushing	Cast Iron	Bore	140	.010"
		Fin. Turn	255	.007"
		Face	255	.006"
Friction	Cast Iron	Rough Turn	192	.011"
		Face	192	.0054"
		Fin. Bore	253	.011"
Pinion Shaft	S.A.E. 1035	Turn	330	.011"
		Turn	239	.015"
		Turn	150	.015"
		R. Turn Taper	134	.008"
Overhead Pilot Bar	S.A.E. X1315	Fin. Turn Taper	134	.008"
		Turn	315	.015"
		Turn	315	.015"
Hand Wheel Sleeve	Cast Iron	Rough Turn	177	.015"
		Rough Face	177	.0073"
		Rough Face	146	.0073"
		Rough Turn	146	.015"
		Fin. Face	177	.0073"
		Fin. Face	146	.0073"
Intermediate Shaft	S.A.E. 3150	Turn End	146	.008"
		Turn Dia.	192	.015"
		Turn Dia.	192	.011"
		Turn	150	.011"
Back Shaft	S.A.E. 2315	Turn	150	.011"
		Turn	150	.011"

Table II—Typical cross-section of carbide general purpose tool work at Warner & Swasey Company, Cleveland. Carbide has been applied to approximately 1,500 jobs to date with an average increase of 43 per cent in machine capacity.

STEEL

APPLIES TO
STEELS UP TO
400 BRINELL

	POWER CONSTANT	Cut	Feed	Cut	Feed	Cut	Feed	Cut	Feed
		1/8 to 1/4	1/32 Max.	1/16 to 1/8	1/32 Max.	1/32 to 1/16	.020 Max.	1/64 to 1/32	.010 Max.
		F.P.M.		F.P.M.		F.P.M.		F.P.M.	
S.A.E. 1010-1025	6	150-350 300		200-600 400		300-800 600		500-1800 600	
S.A.E. 1030-1095	8	150-350 275		150-350 275		200-350 275		300-600 400	
S.A.E. 1112-1120	6	150-350 300		200-600 400		300-800 600		500-1800 600	
S.A.E. 1134-X1340	8	150-350 275		150-350 275		200-350 275		250-500 350	
S.A.E. T1330-T1350	9	150-350 275		150-350 275		200-350 275		250-500 350	
S.A.E. 2015-2320	7	150-350 300		150-350 300		250-500 300		400-600 500	
S.A.E. 2330-2350	9	150-350 275		150-350 275		200-350 275		250-500 350	
S.A.E. 3115-3130	8	150-350 300		150-350 300		250-500 300		250-500 350	
S.A.E. 3135-3450	9	150-350 275		150-350 275		200-350 275		250-500 350	
S.A.E. 4130-4820	9	150-300 250		150-300 250		200-350 275		250-500 350	
S.A.E. 5120-52100	10	150-300 250		150-300 250		200-350 250		250-500 350	
S.A.E. 6115-6195	10	150-300 250		150-300 250		200-350 250		250-500 350	
CAST STEEL	9	150-300 250		150-350 275		150-350 275		150-350 300	
STAINLESS STEEL				ON APPLICATION					

Table I—An example of comprehensive technical data now available to assist in establishing a practical speed for general-purpose carbide tool use. Light figures indicate suggested range of equipment. Bold face figures indicate safe starting speeds for average applications. This particular table applies to average work on steel.

ated with carbide tool use in order profitably apply carbides. The objective at Warner & Swasey has been the broad, overall use of a minimum number of general-purpose carbide tools and grades, rather than the 'nth

degree of speed on any given job. This plan has proved extremely practical and profitable and today in this plant carbide tools are used quite as easily and freely as steel tools of the more common variety.

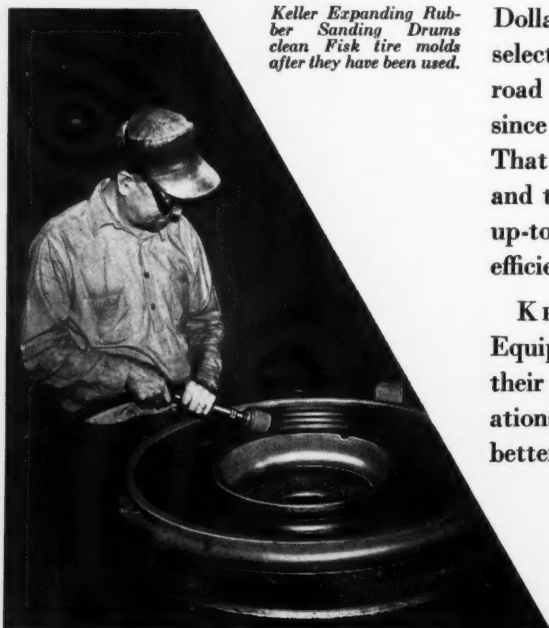
Abrasive Snagging Wheels Bulletin Form ESA-62. An illustrated and descriptive eight-page bulletin regarding Abrasive Snagging Wheels for foundry and billet grinding is now being issued by the Abrasive Company, Division of Diamond Saw & Steel Co., Tacony and Grayley Sts., Philadelphia, Pa. The bulletin contains information pertaining to recent improvements in the Abrasive Company and includes the latest standard recommendation tables for vitrified and resinoid-bonded wheels for floor stand,

swing frame, and portable grinders. Copy free upon request.

Despatch Tempering and Drawing Furnaces. Construction features, advantages, and specifications of Despatch furnaces for tempering and drawing tools and dies, and for metallurgical laboratories are given in Bulletin No. 83 now being issued by the Despatch Oven Co., Minneapolis, Minn. Copy free upon request.

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Keller Expanding Rubber Sanding Drums clean Fisk tire molds after they have been used.



Dollar-wise motorists have been selecting the safety, mileage and road comfort of Fisk Tires ever since "dusters" were the vogue. That record speaks for itself... and to maintain it Fisk must use up-to-the-minute equipment and efficient manufacturing methods.

KELLERFLEX Flexible Sanding Equipment was the choice for their cleaning and finishing operations because they found it faster, better and more economical. The

BELOW: The sleek lines of Fisk white-wall tires are enhanced by a final factory cleaning with Kellerflex Sanding Drums. At Fisk Keller Burs have changed mold finishing from a tedious hand filing job to an easy, power-driven, accurate operation.



Shesfire Molds at FISK

ts have been played by KELLERFLEX in
mileage and the smoothly rolling Fisk produc-
Fisk Tires even on lines has been duplicated in
the the vogue hundreds of other industries.
for itself... They all agree on the low upkeep,
Fisk must use speed, accuracy and efficiency of
equipment and KELLERFLEX-Headquarters for the
ing method best of Flexible Shaft Equipment.

Write for complete information.

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PRATT & WHITNEY

Division Niles-Bement-Pond Company

West Hartford, Conn.

Kellerflex Sales Dept.



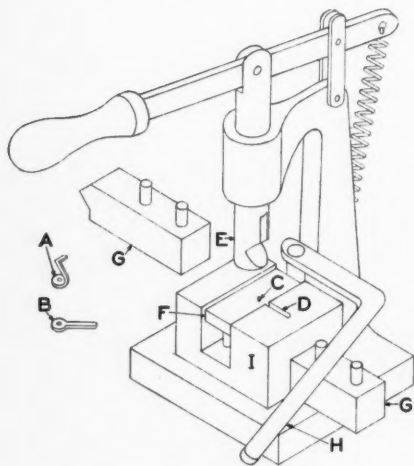


IDEAS FROM READERS

Fixture for Forming Small Parts

By CHAS. H. WILLEY

THE drawing presents the design of a simple fixture for forming small parts of the type indicated at A and B, which is used for the zero adjustment of pointers on electrical



Hand-Operated Fixture for Forming Small Parts

instruments. The fixture consists essentially of the punch E, pressure plate F, forming slide G, handle H, and block I. The punch E has a slot milled in the side in the shape of a

V, and the forming slide G is correspondingly shaped at one end to fit into the slot of the punch. The slide is made to move freely in block I.

Pressure plate F is supported by springs (not shown) and carries pin, C, for locating the blank to be formed. The slot D in block I is milled only deep enough to hold the tongue of the blank in the desired position until the forming operation actually starts. A flat ground on the side of the punch provides clearance space for the tongue as it is bent upward.

In use, the blank B is placed on the pin C with the tongue in ground D. The punch E is then pulled down, forcing the pressure plate F, carrying the part B, down until the tongue of the workpiece is bent upwards. When the punch has reached the depth of the stroke, the forming slide G is forced inward by pushing the handle H against one of two pins fastened in the slide, causing the V-shaped end of slide G to force the tongue of the workpiece into the V-shaped slot in the side of the punch and thus forming it to the shape shown at A.

The slide G is then pulled back again and the punch is raised, thus allowing the pressure plate to return to normal position by the force of the springs. The formed piece is then replaced with a new blank and the

MARVEL SAWS

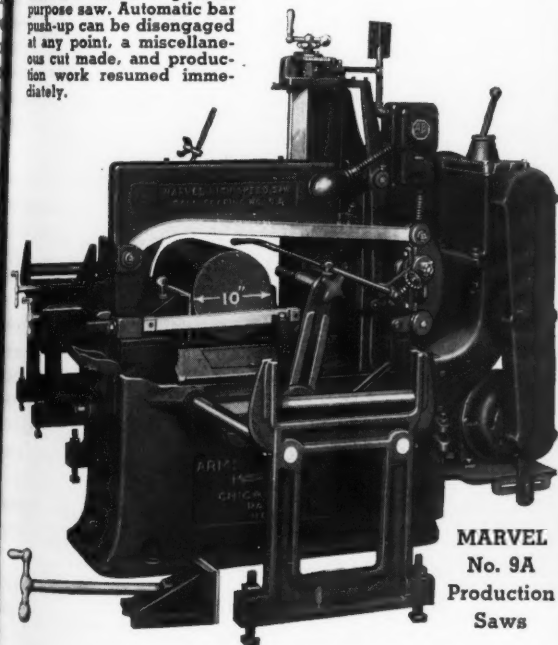
10" x 10"

Capacity and more pieces cut-off from bar per hour than by any other method.

Strictly production machine tools built for continuous high speed operation, MARVEL 9A Saws automatically feed single or nested bars, accurately measure and cut-off thin slices or long lengths at extremely high speeds. Stop automatically when completing desired number of pieces.

• Full ball-bearing construction throughout. Combination positive-and-friction feed. Depth gauge will raise blade at any desired depth of cut. (for notching or slotting). Blade always horizontal, cuts on draw stroke, raises out of cut on fast return. Rigid saw frame is reciprocated by crank lever or shaper link action (33 1/3% faster than ordinary crank action).

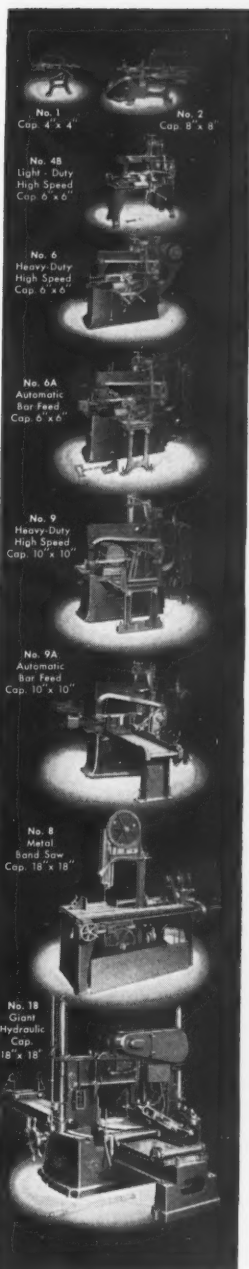
Serves as both production and fast, accurate, general purpose saw. Automatic bar push-up can be disengaged at any point, a miscellaneous cut made, and production work resumed immediately.



**MARVEL
No. 9A
Production
Saws**

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"The Hack Saw People" • 5700 Bloomingdale Ave., Chicago, U. S. A.
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No. 1
Cap. 4" x 4"

No. 2
Cap. 5" x 8"

No. 4B
Light - Duty
High Speed
Cap. 6" x 6"

No. 6
Heavy-Duty
High Speed
Cap. 6" x 6"

No. 6A
Automatic
Bar Feed
Cap. 6" x 6"

No. 9
Heavy-Duty
High Speed
Cap. 10" x 10"

No. 9A
Automatic
Bar Feed
Cap. 10" x 10"

No. 8
Metal
Band Saw
Cap. 18" x 18"

No. 18
Grant
Hydraulic
Cap.
18" x 18"

forming operation is repeated.

Although hand-operated, a production of 800 pieces per hour has been obtained on this fixture.

Concave Radius Truing Fixture for Cylindrical Grinding Machine

By J. R. WHITTLES

A FIXTURE designed to hold a diamond for truing concave radii in grinding wheels on center-type cylindrical grinding machine is illus-

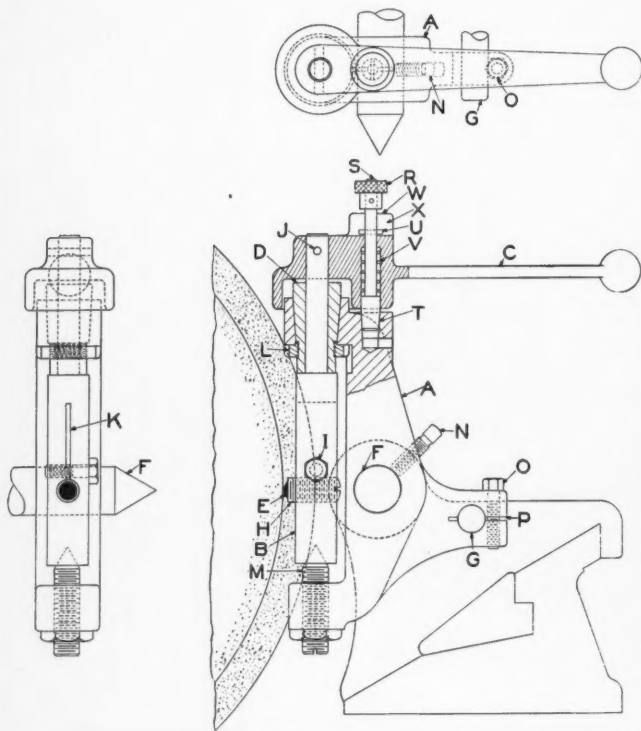
trated in the drawing. The features of the device consist in that it is always ready for operation, it is simple to operate, and is easily adjusted.

The device is designed to be held in a fixed position on the footstock center of the machine, where it is always available for immediate use but can be moved out of the way when not needed. The frame of the device, **A**, is bored to slip over the footstock center, indicated at **F**, and also over the guide pin **G**. The guide pin is just a straight piece of drill rod, but a hole has to be drilled for a drive fit for it in the body of the footstock.

With the device in position as shown, the cap screw **O** is tightened

to close the slot. The cap screw **P** just enough to make the device a sliding fit on the pin **G**; then the device can move in or out with the footstock center as the machine is loaded or unloaded. The device is anchored to the center by tightening the setscrew **N**.

The diamond is located in the end of the adjusting screw **H**, which is threaded into a cross hole in the vertical holder **B**. Holder **B** is supported at the bottom by the threaded center **M** and at the top by the tapered split bearing **A**. Adjustment for



Drawing of Concave Radius Truing Fixture for use on Cylindrical Grinding Machine

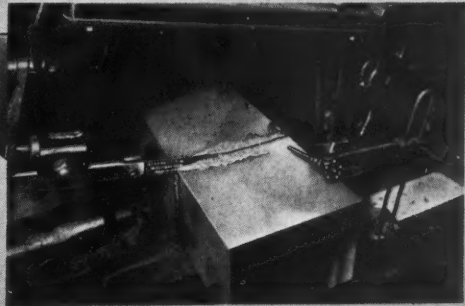
STARRETT HACKSAWS

WHICH IS YOUR METAL CUTTING JOB?

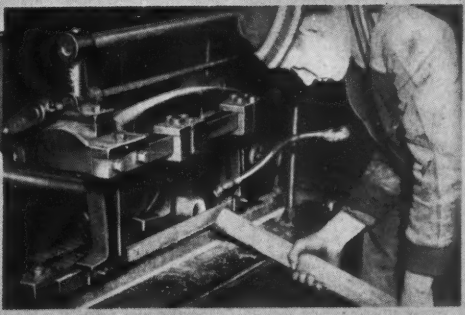
For best results, pick the one best hacksaw blade for every job from the complete line of Starrett Hacksaws



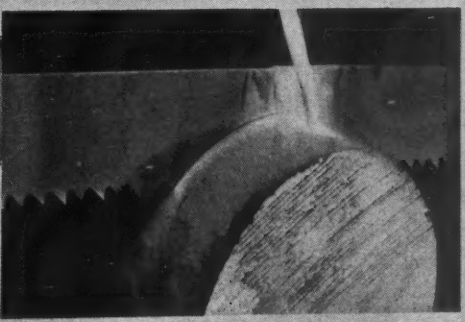
Starrett Molybdenum Special Alloy Hacksaws are the best treating methods developed by Starrett. They are tough, fast and low cost blades for cutting hard and other metals hard to cut with other blades. Available in hand and machine sizes. Try a box today.



Starrett 1841 High Speed Steel Blades are "production" saws designed to make the maximum number of cuts at speed. For the toughest kind of cutting specify STARRETT High Speed Saws. Made for hand frame and machine use.



Starrett Tungsten Alloy Steel Hacksaws, even though lower priced, are the best blades for all general work except the most difficult jobs. Known in All Hard, Flexible Back, Semi-Flex for hand frames; also for light and heavy power machines. High speed is not necessary.



For complete information that will enable you to pick the one best blade for every job, write for Starrett Hacksaw Book MD

THE L. S. STARRETT CO., ATHOL, MASSACHUSETTS, U. S. A.

AVAILABLE THROUGH ALL LEADING SUPPLY HOUSES

the split bearing is provided by the spanner nut **L**. A slot **K** is provided in holder **B**, opening into the threaded hole for the diamond holder **H** so that, after the diamond has been adjusted by means of a screw-driver, it can be locked in position by means of the cap screw **I**. In use, the diamond is swung through the arc of the circle by means of the hand lever **C**.

The hand lever **C** is attached to the vertical diamond holder **B** by means of the pin **J**, so that the diamond can be rotated as desired. The hand lever also carries pull-pin **S** with its knurled head **R**; the lower end of the pin, together with a small coil spring **V**, fitting into a counter-bored hole in the under-side of the lever. At the point where the hole is drilled for the upper end of the pull-pin, a boss is provided in which a slot **W** is sawed for the cross-pin **U**.

When it is desired to true a straight surface on the wheel-face, the diamond is locked in place by dropping the lock-pin **S** into the tapered hole **T**, pressure being applied downward by the spring **V**. When it is desired to true a radius, the lock-pin **S** is withdrawn from the hole and locked in a raised position by turning it so that the pin **U** rests on the top of the boss at right angles to the slot, thus allowing the hand lever to swing.

The moving parts of the device are covered with a canvas boot to keep out abrasive grit and grinding compound.

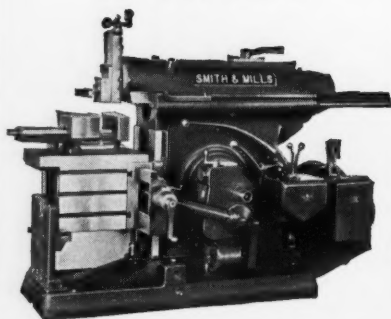
Graduated Chuck is Useful

By C. A. MOWREY

AT VARIOUS TIMES in the past we have found it necessary to mark the work held in a chuck to serve as a guide, either for indexing purposes or so the piece could be returned to the original setting after being revolved or for some similar purpose. Both to simplify this matter and to ensure accuracy, we indexed a chuck as shown in the illustration.

To perform the indexing operation we used the jaws of the chuck to clamp the chuck near the middle of

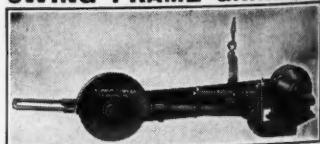
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SIMONDS BAND
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SIMONDS HARD-EDGE METAL-CUTTING BAND-
SAWS have a tough "backbone" that makes them stand up longer under harder service. The back edge of every blade is heat-treated to prevent stretching . . . and elimination of stretching means less breakage, no shelling of teeth. What's more, these teeth are perfectly milled . . . and evenly set on both sides . . . to assure clean cutting and easy running. And joints are welded for extra tensile strength. You can quickly get the Simonds Metal Band you need to cut saw-costs and improve quality on your work.

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true a
eel-face.
place by
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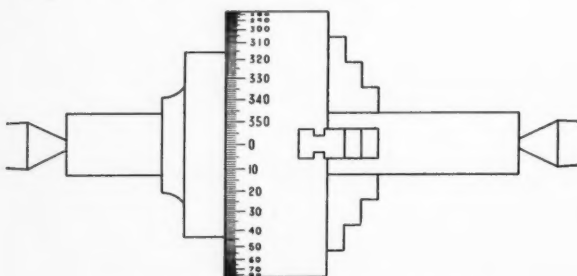
or wheels.
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ber, 1940 December, 1940

MODERN MACHINE SHOP 111

a bar and swung the bar between the centers of a lathe, using a graduated plate on the spindle as a guide for

which can be held by clamping in lathe toolpost.



Drawing of Chuck with Graduated Body

indexing the chuck body.

The graduations on the chuck-body can be cut in by any one of several methods; they can be engraved or routed by the use of a fine cutter held in the chuck of a toolpost grinder, or simply cut in with a suitable tool

Repairing a Gear Housing

By H. A. EVARTS

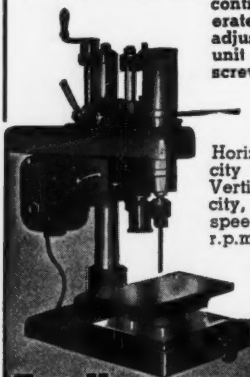
AMONG the tools that have come to me was one of repairing the gear housing illustrated in the drawing. On opposite sides the housing were holes, each with a

diameter 10-pitch thread. The thread in one side was stripped, and it was my job to find some means of making it as good as new.

The piece was too large to handle in the lathe, so I set it up on a milling machine and rough bored

MAXI-JR.-E. Super Sensitive Drilling Machine

For small holes .004" to .250" diameter. Self-contained drilling unit swings radially on column and locks to any position. All controls manually operated. 8" vertical adjustment of drilling unit with elevating screw.

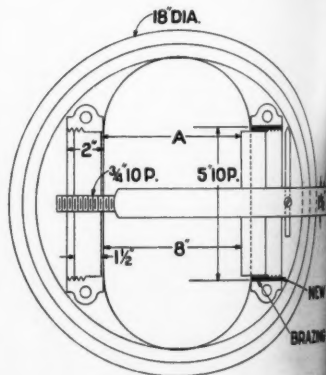


Horizontal work capacity to center, 9 1/2". Vertical work capacity, 10". Spindle speeds, 750 to 12000 r.p.m.

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THE HAMILTON TOOL CO.
400 N. 3RD ST. HAMILTON, OHIO



Drawing Illustrating Method of Using Plugs in Repairing a Worn Gear Housing

hole to approximately 5 1/2 in., which I turned it over to the welder to have the hole built up with bronze. This done, I set the piece up on a milling machine again and bored the hole to the correct size for threads.

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A. EVARTS

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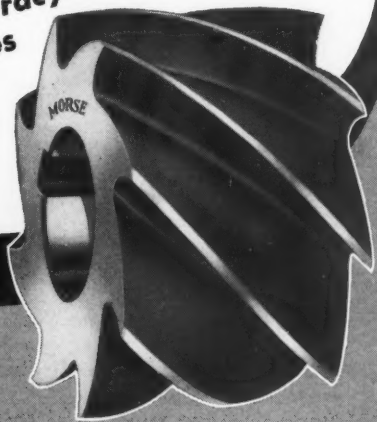
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December, 1940



**On the Toughest
Job or the Most
Critical Operation,
Morse Cutters Keep Pace with the
Power and Accuracy of Today's
Milling Machines**



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MODERN MACHINE SHOP 113

O. Z. COUNTS ON P-K FOR THE "SQUEEZE"



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"Doubtful Screws"
by using Quality-Controlled
Parker-Kalon Socket Screws**

Great pressure is required in making this big electrical connection permanently secure. It is no job for "doubtful" socket head cap screws. That's why O.Z. Electrical Mfg. Co., Inc. specifies PARKER-KALON.

Ever manufacturer who seeks maximum protection against the troubles which may be caused by a few "doubtful" - imperfect - screws in a lot, is sure to be interested in the unique Quality-Control routine under which Parker-Kalon Socket Screws are produced. WRITE FOR FOLDER which describes this routine, free samples and distributor's name. Parker-Kalon Corp., 198 Varick St., New York.



Quality-Controlled

16-point test-and-inspection routine covering: Chemical Analysis, Strength, Ductility, Hardness, Head and Socket Dimensions, Thread precision.



PARKER-KALON
COLD-FORGED
Socket Screws

My next step was to have the hard maple plugs turned; one which was drilled through the center and tapped with a $\frac{3}{4}$ -in. 10 P. while the other was drilled with a $1\frac{1}{2}$ -in. drill. Both of the plugs were of a size that made a tight fit when they were clamped in the housing.

I now made a bar, B, $1\frac{1}{2}$ in. diameter with a $\frac{3}{4}$ in. 10 P. three inches long on one end. A hole was drilled through the bar to hold the toolbit, and a setscrew was put in to lock the toolbit in position. With this tool I cut a new thread, backing the bar out and tapping the toolbit out about 0.002 in. after each cut. The result was a perfect job, and at a cost of less than \$20. A new housing would have cost \$125, and would have taken two weeks to obtain.

Improvements on "Handy Tool"

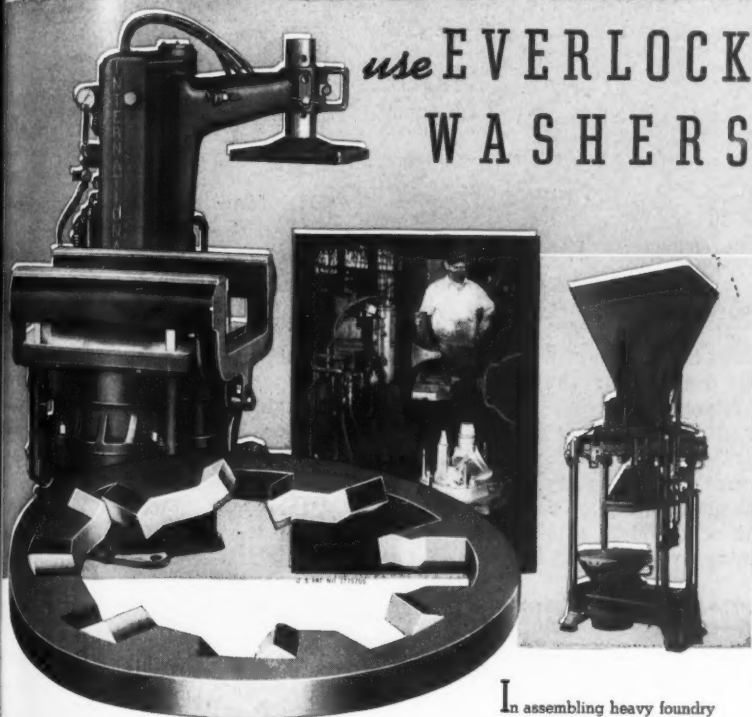
By CHARLES C. LYNDEN

HAVING met the problem posed by Mr. A. H. Waychoff in his presentation of "Handy Tool for Boring Hemispherical Cavities" (Modern Machine Shop, October 1940, Page 120), I found the solution wanting. With one-half of the ball ground off as Mr. Waychoff shows it, the tool showed persistent tendencies to wander from the contact point and also to dull rapidly. After some study, however, we worked out an improvement which eliminated the handicaps.

Instead of grinding off half of the ball, after attaching it to the stem or spindle which was to serve as its shank, it was milled from the end, opposite quadrants being milled away to the center of the sphere. Thus two opposed cutting edges were provided each with the desired contour. Being opposed, the cutting action of each

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use EVERLOCK WASHERS



Washer Tongue Detail

In assembling heavy foundry machines, like those pictured, the International Molding Machine Company of Chicago use EVERLOCK WASHERS to stop loosening of nuts, bolts and screws . . . These massive, powerful machines are subjected to severe shocks and vibration. The core blower, pictured at the right, sets up a terrific vibration on the hopper while in use due to its action of two thousand motions per minute . . . The molding machine, pictured at the left and in the center, has a constant jolting action while in motion. The table is raised three inches and slammed down 150 times every minute . . . On this table 600 pounds or more of sand, including flask, is held rigidly in place . . . EVERLOCK WASHERS play a vital role in holding the many parts of these machines together . . . The International Molding Machine Company know that EVERLOCK WASHERS do the job more satisfactorily than any other locking devices . . . Look to EVERLOCK WASHERS for the solution of your lock washer problems . . . Listen to the enthusiastic praises of the users of EVERLOCK WASHERS and profit by their experience . . . There is an EVERLOCK WASHER of the correct size and type for every purpose.

Immediate Deliveries

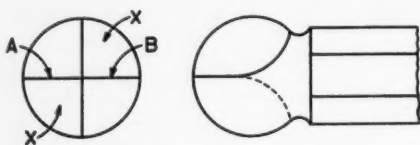
OFTEN OTHER WASHERS HAVE BEEN TRIED, NOW EVERLOCKS ARE SPECIFIED

THOMPSON-BREMER & CO. 1636 W. HUBBARD ST., CHICAGO, ILL.

PRINTED IN U.S.A.

cutting edge counteracted the tendency of the other to wander and made straight cutting feasible.

To speed up the work, a $\frac{3}{8}$ -in. drill



Drawing of Improved "Handy Tool for Boring Hemispherical Cavities." A-B—Cutting Edges. X-X—Milled-Out Portions.

was used at the point of each hemispherical depression to drill to the depth desired for the finished hole. The forming tool was then run solely as a finishing operation, which necessitated removing only a fraction of the material necessary under the original plan. The pilot hole relieved the point of the drill of all but a slight cleaning-up load, and the life of the

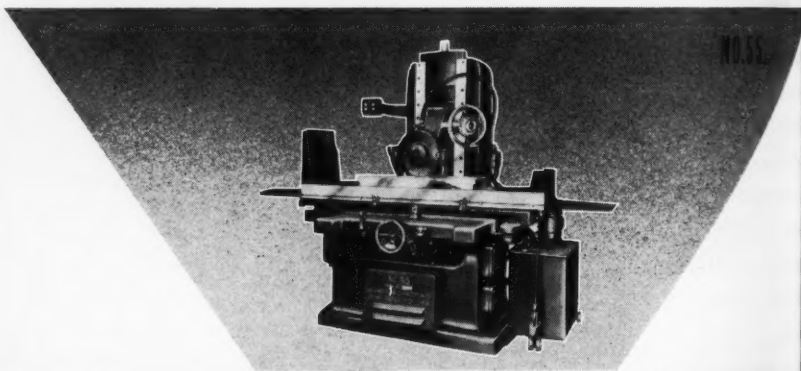
two-lip cutter proved to be many times that of the original design.

Fixture for Holding Thin Plates

By W. H. NOSTELL

THE familiar type of Laird cross head used on most locomotives is so designed that a channel is provided which encloses the bottom guide on three sides. The three contacting surfaces of the crosshead channel are, of course, subject to wear, consequently a babitted shoe is provided to bear against the top of the shoe with two 6 x 28-in. bronze plates to take the wear on the sides. The plates are held in the crosshead by the same bolts that are used to anchor the babitted shoe.

Inasmuch as a supply of the



● This "GRAND RAPIDS" Hydraulic Feed Surface Grinder was designed for grinding to earn greater grinding profits in your plant. Table speeds up to 150 ft. p.m. with minimum power and wheel cost. Sizes from 6" x 18" to 30" x 144".

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100 STRAIGHT AVE. GRAND RAPIDS, MICH.

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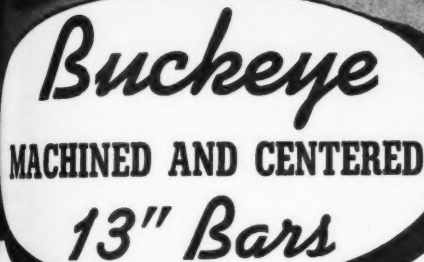
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Buckeye

MACHINED AND CENTERED

13" Bars

Buckeye cored and solid 13" bars, with machined inside diameters and machined and centered ends, are ideal for maintenance work. Buyers save approximately 25% of purchased weight as compared to rough bars, and avoid making the hard outside cut. Set-up in a universal chuck can be accomplished quickly. The bars are easily machined to finished size and can be cut to standard bearing lengths with a minimum of waste. Typical Buckeye quality throughout—free of blow holes. Prompt shipment of the most popular sizes from stock. Write for prices and full details.

No order is too big or too small for Buckeye

OTHER BUCKEYE PRODUCTS INCLUDE . . .

13" rough bars in a wide range of sizes, 851 sizes of ready-to-use finished bushings, 160 sizes of ready-to-use electric motor bushings—carried in all warehouse stocks . . . also special bearings in an infinite variety of shapes, sizes, and bearing metal analyses to meet any specification.

Let us quote on your requirements

Buckeye

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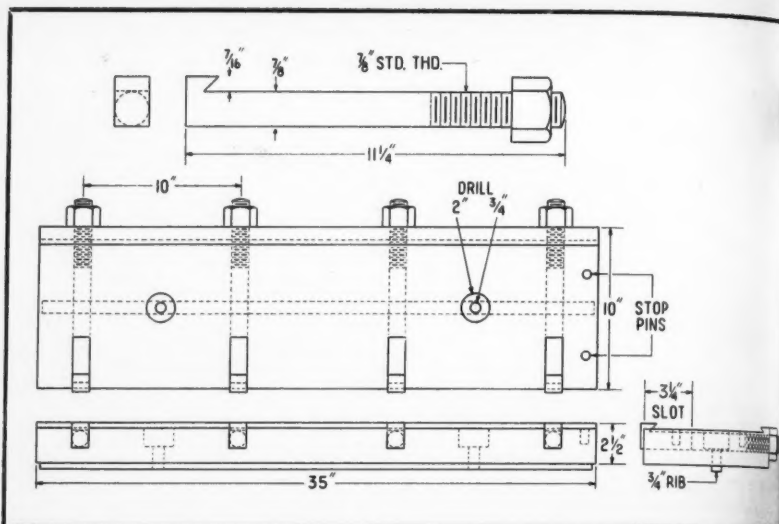
BRONZESMITHS

SINCE 1900



CLEVELAND, OHIO

112 HAWTHORNE AVE.



Drawing of Fixture for Holding Thin Plates

bronze plates must be maintained continuously, a large number of the plates are machined at a time; the finishing operation being performed on the planer or, occasionally, the shaper. In the rough state the plates are about $\frac{1}{2}$ -in. thick and after planing are approximately $\frac{1}{4}$ -in. thick. However, because of the thinness of the plates they cannot be held in an ordinary planer chuck, consequently it became necessary to design a special fixture for this operation. The

fixture is illustrated in the drawing and photograph herewith.

As shown, the base of the fixture is made with a rib that fits into the slot in the planer table to maintain the fixture in parallel position. Four equi-distant points holes are drilled and tapped crosswise in the base for four $\frac{7}{8}$ -in. bolts, as shown, and slots are milled in to meet the bolt holes from the opposite side of the fixture so that the hook on each bolt will project above the base.



If it's STUD SETTING—It's our SPECIALTY

We can supply the proper tool for all sizes and types of stud setting—from 4-40 to 3" and larger if needed. Tools that are designed for small lots or large, for all standard and special types of studs, electric, pneumatic, machine tool or hand drive.

Send us a sample stud or sketch
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TITAN TOOL COMPANY • FAIRVIEW, PA.

CARBORUNDUM *Congratulates* RUSTLESS IRON AND STEEL CORPORATION



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VIEW, PA

Down in Baltimore they have made an already great
greater. Rustless Iron and Steel Corporation
just completed and opened an impressive addi-
to increase its production facilities.

This is important and welcome news because it means,
of course, the expansion of an important industry
as producers of stainless steel products.

Extending our congratulations we take a pardon-
able pride in pointing out that grinding wheels by
Carborundum are used exclusively on the battery of
Cincinnati Centerless Grinders in this plant.

These wheels are being used on all production work,
starting with the first or rough grinding passes and
continuing right on to the production of the highly
finished bar stock of all grades of stainless steel.

Once again it has been a case of providing the right
tool in the right place... of conscientious engineer-
ing service to the end that these wheels have become
necessary and vital factors in maintaining high quality
standards and high production records, and in linking
the name "Carborundum" with that of "Rustless".

CARBORUNDUM
ABRASIVE PRODUCTS



THE CARBORUNDUM COMPANY

EST. IN 1887

Niagara Falls, N. Y.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit,
Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum is a registered trade-mark of and
indicates manufacture by The Carborundum Company)

enough to grip the work. Stop pins are located in the base at one end to help hold the work from slipping endwise.

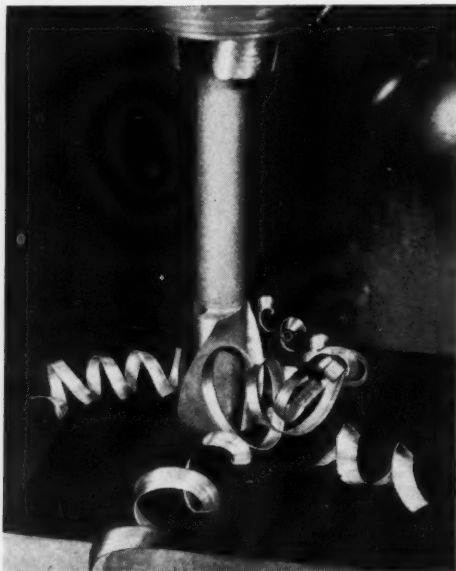
To use, the bronze work-piece is placed in the channel in the fixture and is clamped by tightening the nuts on the four bolts. The hooks on the bolts draw the bronze plate against the 45-deg. beveled undercut ledge and it is thus held firmly while the planing operation proceeds. Such a fixture may be made in various lengths for long work or for gang planing.

"The Construction of Electric Furnaces for the Laboratory" is the title of a 24-page catalog now being published by the Norton Company, Worcester, Mass., as an aid in the design and construction of small laboratory furnaces suitable for relatively high temperatures. The purpose of the catalog is to help the reader to make proper selections of refractory shapes and to

use them to advantage. To this end detailed methods and design data are presented. According to the publisher all of the furnace assemblies described in the catalog have been actually built and tested under laboratory service conditions. Copy free upon request.

"The Aviation Cleaning Handbook" The Magnus Chemical Co., Inc., Greenwood, N. J., has issued a descriptive and illustrated 24-page booklet for aviation use entitled "The Aviation Cleaning Handbook." The handbook thoroughly describes cleaning methods and materials for use in the maintenance of aircraft, airports, engine shops, and on.

A few of the cleaning problems discussed in the aircraft section of the handbook are the cleaning of wings, fuselages, dismantled motors, prevention of sludge in motors, and stripping finishes. In the section devoted to cleaning operations in and around airport buildings and shops, such problems as cleaning cement floors and runway machinery interiors of buildings, and cleaning and protecting workers' hands are discussed. Copy free upon request.



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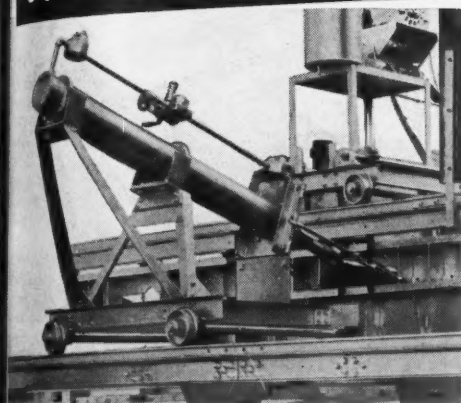
"TU-LIP" COUNTERBORES

A fitting companion to the famous Weldon End Mill. A trial of this tool will convince you it is the fastest, cleanest cutting counterbore on the market.

Send for Our No. 8 Catalog

THE WELDON TOOL CO. • 3000 Woodhill Road, Cleveland, Ohio

..Ever See a 2500 lb. Clinker?



Curtis Air Cylinder Installation manufactured by the Mace Company, in collaboration with the W. F. Hahn Company, both of Denver, Colorado.



A Curtis Air Cylinder Changed This 20 Minute Operation Into One of 20 Seconds!

● In the process of smelting gold, silver or copper concentrates, a clinker or sinter is formed on the grate bars. This cake weighs approximately 2500 pounds, and to remove it by hand formerly was a 15 to 30 minute operation. By connecting a Curtis Air Cylinder to a blade sliding over each furnace grate, the Lepanto Consolidated Mining Company, P. I., is able to remove the sinter and return the blade to position in 20 seconds. The saving in time materially increases the capacity of the 12 furnaces.

This is only one example of the many hundreds of applications in which Curtis Air Cylinders are stepping up industrial production and lowering production costs. Curtis Air Cylinders provide a fast, smooth, accurate method of handling materials, gates, presses, doors, etc.,

—in fact they'll perform almost any pushing, pulling or lifting operation.

Curtis Air Cylinders cannot be damaged by overloading; they are immune to abuse. They provide exceptional accuracy of control, yet can easily be operated by unskilled labor.

It's more than likely that Curtis Air Cylinders can be used to good advantage in your plant, too. Write for free, new booklet, "How Air Is Being Used in Your Industry," and full information on Curtis air operated equipment.

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1913 Kienlen Avenue, St. Louis, Mo.

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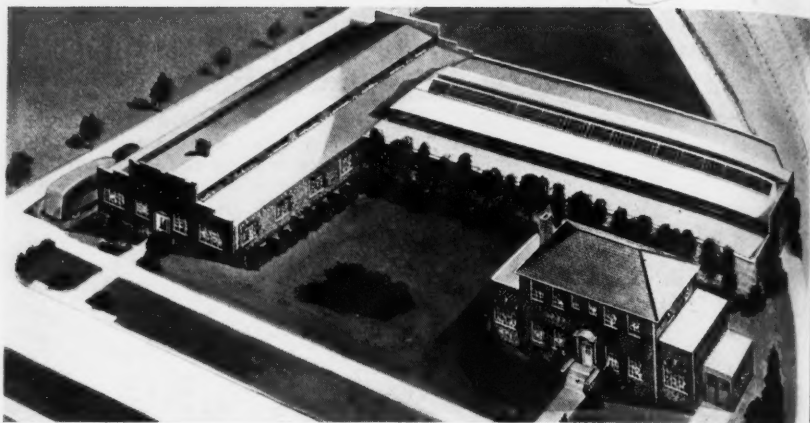
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DoAll Opens New Factory for Production of Metal-Cutting Band Saws

A PLANT devoted in its entirety to the manufacture of "DoAll" band saws for cutting metal has been opened by The DoAll Company at 1201-1225 Thacker St., Des Plaines, Ill. The plant, exclusive of the office

building contains 15,600 square feet of floor space, all of which is occupied by machinery and equipment for production of the narrow precision band saws for metal cutting which comprise this company's product.

Kennametal Chart No. 5. McKenna Metals Co., 300 Lloyd Ave., Latrobe, Pa., is now issuing a chart listing the horsepower requirements for cutting steel with Kennametal-tipped tools. The purpose of the chart is to enable the tool supervisor to advise the machine operator what depth and feed a machine will pull in cutting steel with Kennametal tools. Timestudy men will find the chart useful in recommending the best feeds and speeds for the equipment available, or for recommendations on the size of motors required on lathes and boring mills for which certain combinations of speeds and feeds will be demanded.

A formula on the chart facilitates the calculation of the horsepower required

for any steel of which the tensile strength is known and on which a known feed and speed of cut is to be used. Copy of Kennametal Chart No. 5 free upon request.

Modern Products Catalog 40. A 34-page Wire-O bound catalog covering the "Modern" line of products is now being issued by the Modern Collet & Machine Co., 401 Salliotte St., Ecorse, Mich. The line includes spring collets, feed fingers, collet tubes, pusher tubes, chucking fingers, alloy steel cams, equalizing finger holders, and many other perishable parts or tools for screw machines.

Copy of Catalog 40 free to mechanical executives upon request.

Who Uses **ROSS** *Air Control* **VALVES?**

The automotive industry uses them by thousands. The great rubber plants, the large steel mills, the glass and the brass industries, the operators of welding equipment, the metal working industry with its heavy punch and stamping presses—all these and countless other Leaders in Their Fields have come to look upon Ross Valves as standard equipment in their plants.

A company is known by the customers it keeps. Ross keeps its old customers . . . and adds new ones as the years go by.

Bring your air control problems to Ross

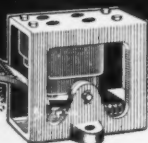
ROSS Operating VALVE CO.
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BRIDLE FOR AIR HORSEPOWER

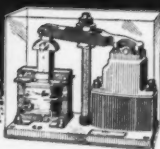
SIZE AND TYPE FOR EVERY OPERATION



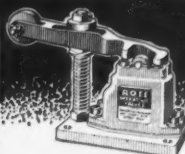
HAND CONTROL



FOOT CONTROL



SOLENOID CONTROL



MECHANICAL CONTROL



PILOT CONTROL



ALL AIR CONTROL

Over the Editor's Desk

AT the moment of going to press reports are coming in from all sections of the country announcing industrial expansions to meet the needs of the rearmament program. Airplane factories, engine plants, arsenals, and machine tool plants are adding to their present facilities and new plants are being built for the production of materials and equipment essential to defense requirements.

Not the least important of the defense activities is the training of help for munitions manufacturing jobs. Airplanes, engines, guns, tanks, shells, and other war materials are made by the use of machine tools; even the machine tools are produced by the use of other machine tools, and each one of these machines will require an operator. Manufacturers who have apprentice systems in operation are enlarging the scope of their training facilities; trade schools are operating to capacity, and new schools are being opened. The trade school in one large American city is operating 24 hours a day, training three shifts of students for machine shop work, and there is a waiting list of applicants ready to step in and begin training the minute a student finishes his training and an opportunity is provided for another.

To aid as much as possible in the development of additional training facilities in industrial plants, the U. S. Department of Labor has announced that attendance at such training programs by employees would not be considered as working time for which compensation would have to be paid by the employer provided (1) attendance on the part of the employee is voluntary, (2) the employee shall not produce any goods or perform any productive work during the training or class period, (3) the training is given outside of regular working hours, and (4) the training course is intended to train the

employee in new, different, or additional skill.

The place where additional training facilities can be provided is in the plant in which, up to now, no such facilities have been provided. There are many plants in this country which, in normal times, have been uninterested in setting up training programs, but which for the next several years, at least, will need more trained men than they can be sure of getting. The management of such a plant should begin at once investigating the procedure involved in setting up an apprentice training program and plan to start training its own operators as soon as possible.

There is plenty of raw material available among the mass of men who have more recently been unemployed on regular jobs. All state WPA headquarters have prepared Defense Industries Employment registers to include those men on WPA projects, or awaiting assignment who have had training and experience in industrial techniques and skills or whose aptitudes and experience fit them for additional training in required lines.

In the preparation of this register the work records of more than 2,500,000 persons have been—or are being—checked and those who have special qualifications or partial training along lines related to industrial occupations will be referred to and encouraged to enroll in vocational training courses offered by private manufacturers or the special vocational training courses offered co-operatively by the WPA, the Office of Education, and the Defense Advisory Commission. The register, for the time being, will be confined to occupations connected with the iron and steel industries, aircraft and shipbuilding, machine shops, tool plants, engine and turbine industries, and others engaged in defense production.

Grains that Stick Better and Cut Faster...

The New Alundum "S" Abrasive

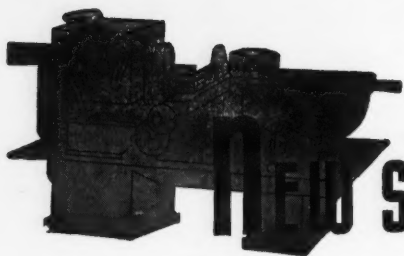
AAVAILABLE in sizes 90 and coarser, the new Alundum "S" Abrasive has proved outstandingly successful in field trials. Not only does its special surface treatment give grains with better sticking power but also a faster cutting action—and a cutting action that lasts. Right up to the moment that recoating is necessary you'll find that wheels set up with Alundum "S" Abrasive are still cutting fast. You'll surely want to try this newest Norton development on your polishing jobs that use size 90 or coarser.

NORTON COMPANY • WORCESTER, MASS.

New York Chicago Detroit Philadelphia Pittsburgh
Hartford Cleveland Hamilton, Ont.

G-114

NORTON ABRASIVES



MODERN MACHINE SHOP EQUIPMENT

Lipe Improved Carbo-Lathe

Designed for high production turning by the use of modern alloy tools, the Lipe Carbo-Lathe, product of W. C. Lipe, Inc., Syracuse, N. Y., is now offered with improvements that are said to add to rigidity and to increase the ability of the lathe to take heavy, precise cuts on tough materials at high speed without chatter or tool breakage.

The base of the unit consists of a box section that completely encloses the motor and drive mechanism, thereby hiding all controls. The motor cabinet has been increased in size so as to amply accommodate a motor rating as high as 10 h.p., a.c., and also to provide additional space for free air circulation and efficient motor ventilation. The base also houses a coolant tank, now double in capacity, and a large size chip pan. Recessed toe room is

provided of sufficient height to prevent interference even when the operator stands on a platform. A compartment at the end of the base provides room for storage of tools and accessories, and since the rigid box-type construction of the improved unit requires additional floor space, the lathe is said to retain its advantage of compactness for close grouping.

The Lipe Improved Carbo-Lathe has a 12-in. swing and a distance of 18 in. between centers. Power from the motor is applied through a worm drive. Reduction of friction is obtained by mounting the spindle on two Timken bearings and by using ball bearings on the clutch pulley, clutch shaft, worm shaft, feed worm-gear shaft, clutch feed shaft, hand-feed shaft, rack pinions, and feed shaft in the bed. The headstock and bed are cast in one solid piece of chrome-nickel iron weighing

600 lb. A correspondingly heavy tailstock of two-piece construction is used. The tailstock quill is 3 in. in diameter and its center can be operated by a hand wheel or lever, supplied optionally.

The great rigidity of construction throughout is said to enable the Lipe Improved Carbo-Lathe to withstand most easily multiple tooling and high cutting speeds. Design further provides for unusual flexibility of setup and quick change from one setup to another in order to accommodate small lots efficiently.



Lipe Improved Carbo-Lathe

Bed-Prentice No. 6 Vertical Milling and Die Sinking Machine

Illustrated herewith is a No. 6 vertical milling and die sinking machine which has been brought out by the Bed-Prentice Corp., Worcester, Mass. The machine has positive gear drive to the spindle, the top box being totally enclosed and dustproof. With V-belt motor drive as part of the standard equipment, the No. 6 machine is said to be a very productive unit, well adapted to handling large dies and general milling.

The main drive pulley is provided with a clutch and brake for start and stop, the clutch and brake being conveniently controlled by two levers at the front of the machine table. To provide complete anti-friction drive from the main driving pulley to the spindle, bevel gear shaft and spindle are mounted on Timken taper roller bearings. In the spindle head, double back gearing with drive to spindle at lowest point is said to provide maximum power and rigidity.

The base and column of the No. 6 machine are of heavy box section, with the base forming a rigid support for the column and saddle. The saddle extends the full length of the working table, thereby forming a rigid support for the table, and has four bearing surfaces scraped to the base. The table, which is similarly scraped to the saddle, has T-slots serving as oil channels, and oil pockets at either end. The T-slots extend through the outer edge of the oil pockets, thereby increasing the working surface of the table. Longitudinal and cross feed screws are of heat-treated chrome molybdenum steel, and threads are milled and polished. Feed screw nuts are of special alloy phosphor bronze and are provided with ball thrust bearings to ensure ease of operation of the table and saddle.

Maximum operating efficiency of the Bed-Prentice No. 6 unit is said to be obtained through power rapid traverse to the table in either direction at 95 in. per minute. The control handle is located convenient to the operator's normal working position and when released disengages and engages feed automatically.

The spindle, which is made of heat-treated, forged chrome vanadium steel, is regularly furnished with a clutch-type spindle nose and standard NMTBA taper. An adapter with

*Operators are More
EFFICIENT
Machines are More
PRODUCTIVE*

with **TRU-LAY** PUSH-PULL CONTROLS

● Operators work with more confidence and efficiency when their machines respond more readily to controls that may be operated at most convenient points.

TRU-LAY Push-Pull Controls are alert and positive in operation. They hold any position to which they are set. There is none of the noise, sloppiness, uncertainty and bother that come with rods, links, bell-cranks, pins and other devices. **Push-Pulls** require no adjustment.

They are easily installed, because they are quickly snaked around any obstructions.



THIS BOOKLET WILL HELP YOU

Write for "The Key to Remote Control." It contains valuable information on the control of mechanisms.



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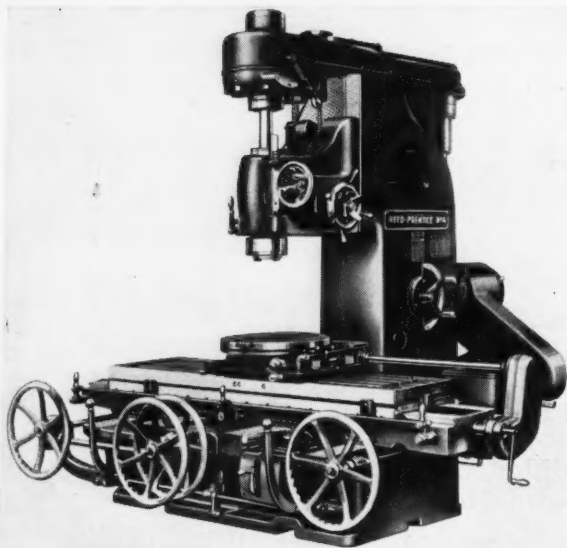
American Chain & Cable Co., Inc.
230 Park Avenue, New York, N. Y.

Please send complete information on **TRU-LAY PUSH-PULL CONTROLS**.

Name

Address

City State



Reed-Prentice No. 6 Vertical
Milling and Die Sinking
Machine

NMTBA taper outside and No. 2 B & S taper inside is available on order. The spindle is equipped with a 12-in. graduated scale and micrometer stop for accurately feeding to depth. Both spindle and head are provided with a counterweight to ensure ease of adjustment. The spindle has 12 speeds ranging from 15 to 500 r.p.m. Speed box gears, which are of heat-treated alloy steel, run in oil on shafts mounted in radial ball bearings. Eight feeds are provided for each spindle speed change. Feed gears are made of heat-treated alloy steel and run in oil.

Specifications of the Reed-Prentice No. 6 Vertical Milling and Die Sinking Machine are—range: longitudinal power

feed, 72 in.; cross power feed, 24 in.; travel head on column, 18½ in.; vertical feed of spindle, 11½ in.; throat depth, 28½ in.; rapid power traverse either direction; longitudinal, 95 in. per min. cross, 95 in. per min. table: working surface, 72 x 20 in.; overall, 84 x 20 in.; rotary table: working surface, diameter, 24 in.; spindle: heat-treated, forged chrome vanadium steel with flange type nose mounted on precision Timken bearings; diameter main bearing, 3¾ in.; hole through spindle, 1¼ in.; spindle speeds, number, 12; range spindle speeds, minimum and maximum, 15 to 500 r.p.m.; number feeds for each spindle speed, 8; total range, 0.002 to 0.250 in.; drive: standard motor drive, 5 V-belts; width of driving belt, 5 in.; weight and floor space: shipping weight, 18,500 lb.; floor space: width x depth x height, 156 x 115 x 115 in. A 10 h.p., 1,200 r.p.m. motor is recommended for use with the machine.

"C & J"

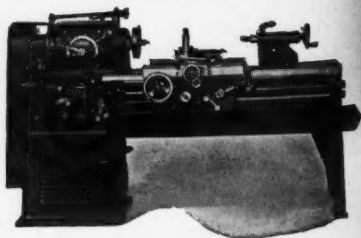
15" and 16" Lathes

12 Speed Geared Head-Motor Drive
Timken mounted spindle

Modern Design ... Liberal Dimensions

Write for bulletin

The Carroll & Jamieson Machine Tool Co.
BATAVIA OHIO, U. S. A.

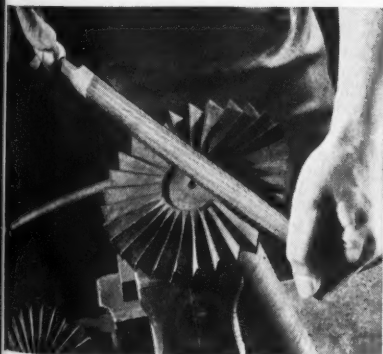




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FOUNDRY FILE



DIE-CAST FILE

GEARED UP FOR ANY FILING REQUIREMENT

SPEED, accuracy and work-volume are the industrial watchwords of today. Metals and their alloyed offspring are manifold. Products and production methods present varying conditions.

The combinations of factors are so many and varied that it is not enough to know which type of tool or device to use, but what *special design in the tool* will lead to the best action or results in a given instance or on a particular job.

This is particularly true of files. Nicholson has found the multiplicity of filing problems big enough to command the exclusive study and attention of specialists.

Deep-rooted in this policy, Nicholson makes nothing else . . . lists more than 3000 kinds, sizes and cuts of files . . . has become the largest file manufacturer in the world . . . and, through well-equipped facilities for fast production, special orders, or consulting service, is *geared up for any filing requirement*.

NICHOLSON FILE CO., Providence, R. I., U. S. A.

(Also Canadian Plant, Port Hope, Ont.)

• **TECHNICAL BULLETINS** on Nicholson and Black Diamond Brass, Foundry, Die-cast, Aluminum "A," Stainless Steel, Long Angle Lathe, Shear-tooth, Lead Float, Aluminum Rasp, etc., are available through your mill-supply house or direct from us.

NICHOLSON
U.S.A.
MADE IN U.S.A.

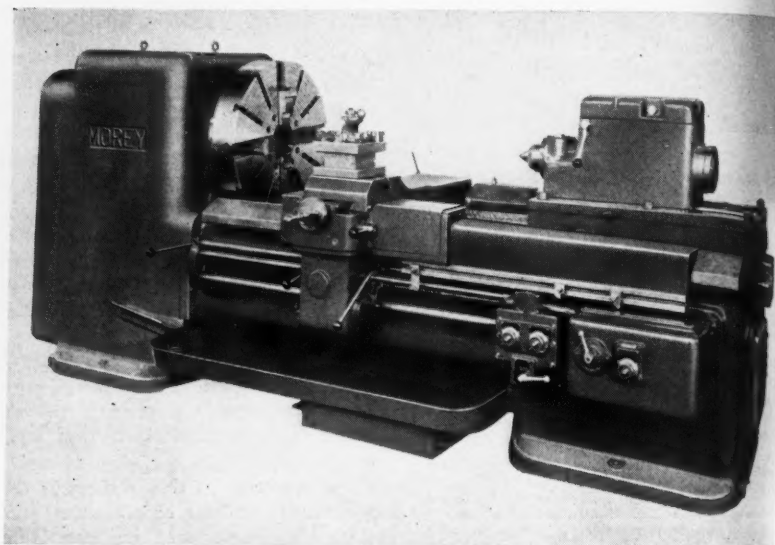
NICHOLSON FILES FOR EVERY PURPOSE

Morey "27" Manufacturing Lathe

A heavy duty hydraulic manufacturing lathe featuring directional fingertip control and designated as the "27" has been brought out by the Morey Machinery Co., Inc., 410 Broome St., New York, N. Y. According to the

carriage. Spindle speeds can be suited to individual requirements, and the spindle is provided with a brake which is automatically applied when the clutch of the lathe is disengaged.

The carriage of the machine is available in the following combinations: (A) With multiple toolholders front and rear, to the finished work shell, in minimum travel of carriage.



Morey "27" Manufacturing Lathe

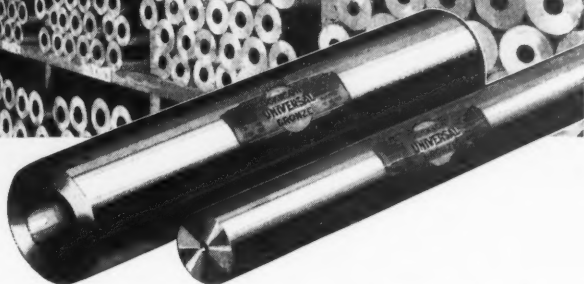
manufacturer, the machine is built for single purpose operations, operating at the maximum speeds and feeds permitted by present-day tool steels, and is designed for efficient handling by non-skilled labor. For turning shells, a special carriage carrying a front multiple toolholder and two adjustable cut-off toolholders in the rear is recommended. Although designed particularly for ordnance manufacturing, the machine can also be used for turning and boring operations that do not involve threading.

The spindle of the "27" lathe is mounted on Timken bearings front and rear and has a 6-in. diameter bore. The main drive herringbone gear is driven through spiral pick-off gears, a twin disc clutch, and multiple V-belt drive to the motor, all of which are enclosed in the headstock and controlled at the

slide. (B) Feed and power traverse movements by hydraulic ram; that is power longitudinal feeds (in both directions) only; hand feed to cross slide. (C) Feed and power traverse movements by a hydraulic ram for longitudinal feeds in both directions. Feeds to the cross slide through hydraulic motor in the control box. (D) Universal carriage feed and traverse movements by hydraulic motor in the control box. (E) Combination universal turret lathe, universal carriage (D) plus a hexagon turret mounted on a separate saddle, hydraulically actuated with individual stops for each face.

Feeds (with hydraulic ram) are minimum, 0.125 in. per min.; maximum infinite; power traverse, 15 ft. per min. Feeds (with universal carriage) are cross feed, minimum, 0.175 in. per min.; maximum, 0.600 in. per min.; long-

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tudinal feed, minimum, 0.210 in. per min.; maximum, 0.715 in. per min.; power traverse, $7\frac{1}{2}$ in. per min. Controls are interlocked so that when the clutch lever is thrown out to stop the spindle, the feeding mechanism stops automatically and cannot be started again until the spindle is started.

Specifications of the Morey "27" Manufacturing Lathe are as follows: height from floor to center, 42 in.; swing over ways, 28 in.; maximum chuck diameter recommended, 24 in.; swing over carriage slide, 11 in.; distance from end of spindle nose and tailstock (12-ft. bed), 48 in.; hole through spindle, $6\frac{1}{4}$ in.; spindle nose, standard; taper center, Morse No. 6; motor (for medium duty, roughing, and general turning), 25 h.p., 1,200 to 1,800 r.p.m.; motor (for heavy duty turning), 50 h.p., 1,800 r.p.m.; approximate weight of machine (12-ft. bed), 12,800 pounds.

Prosser Heavy Duty Carbide Tool Grinder

Thomas Prosser & Son, 120 Wall St., New York, N. Y., has placed on the

market the heavy duty carbide tool grinder shown in the illustration herewith. The grinder is said to embody all the features of the smaller, well-known Prosser Model "AA" Grinder plus ample power for grinding heavy tools and provision for wet grinding.

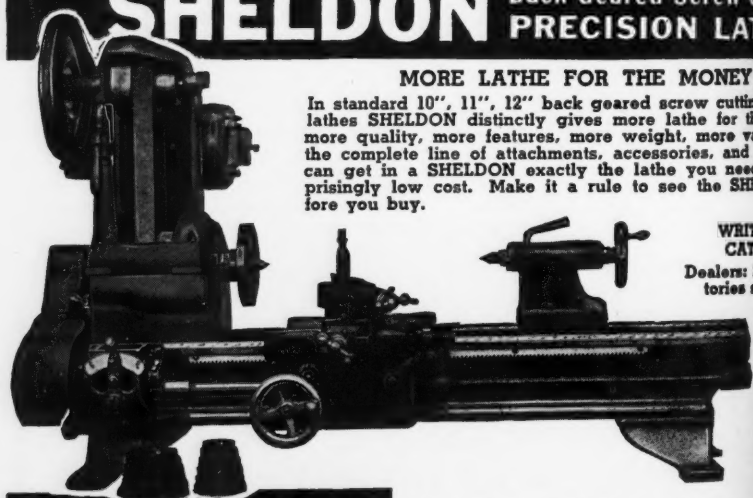
According to the manufacturer, the Prosser Heavy Duty Grinder provides a means for the rapid removal of metal when roughing as well as for the accurate finishing of all single point tools to smooth, keen cutting edges, with flat surfaces held exactly to the desired angles. The total absence of vibration is said to make the machine ideally suited for use with diamond wheels. In addition, the grinder has ample power to permit the use of the coarsest roughing wheels. High speed steel and Stellite tools as well as carbide tools are said to be economically ground on the machine.

One of the principal features of the Prosser Heavy Duty Grinder is the wet grinding equipment which provides a copious flow of water, thereby keeping tools cool and permitting fast grinding of all types of carbide tools without danger of cracking or checking. In ad-

SHELDON Back Geared Screw Cutting PRECISION LATHES

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In standard 10", 11", 12" back geared screw cutting precision lathes SHELDON distinctly gives more lathe for the money—more quality, more features, more weight, more value. From the complete line of attachments, accessories, and drives you can get in a SHELDON exactly the lathe you need at a surprisingly low cost. Make it a rule to see the SHELDON before you buy.



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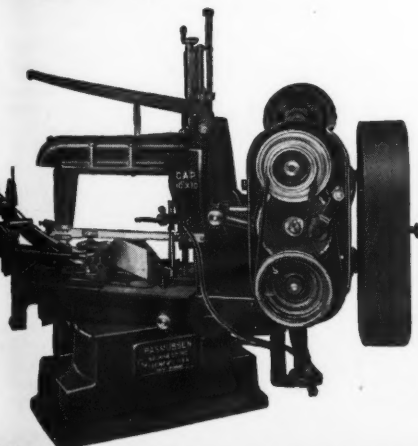
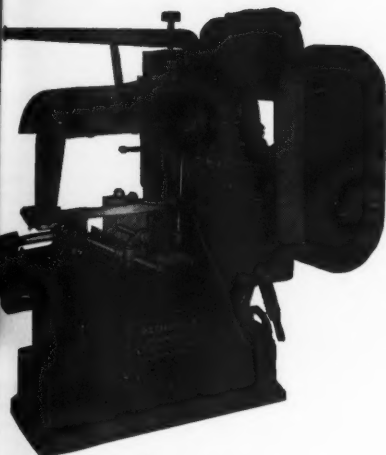
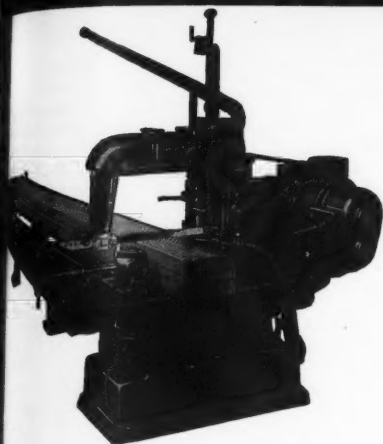
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HEAVY DUTY—HIGH SPEED METAL CUTTING MACHINES

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With 12 foot automatic bar feed.
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dition, less wheel wear is said to result. The wet grinding equipment consists of a coolant pump, pan, and settling tank with all-brass piping, valves, and nozzles. The nozzles are arranged so that the flow of water can be directed on a tool regardless of which side of either wheel is being used.

The Prosser Heavy Duty Unit is



Prosser Heavy Duty Carbide Tool Grinder

equipped with quick-acting indexing tables which can be instantly and accurately set to the desired angle. According to the manufacturer, the tables need never be raised or lowered since their edge remains constantly at the same point with respect to the face of the grinding wheels. The grinder is furnished with a high grade spindle which runs in double-row, self-aligning, precision ball bearings having a labyrinth dust seal, and is driven by double V-belts. In this manner, vibration is said to be reduced to the absolute minimum. The speed of the spindle is set for maximum grinding efficiency.

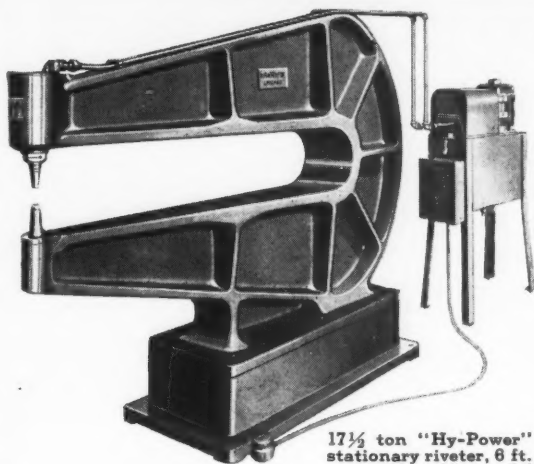
The grinder uses either diamond or

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17 1/2 ton "Hy-Power" portable hydraulic riveter



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Only Hannifin "Hy-Power" hydraulic equipment combines the high speed operation and ease of handling that means increased production with less work. Operators maintain high production rates with less fatigue, for "Hy-Power" hydraulic equipment is designed to minimize handling and effort.

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Hannifin "Hy-Power" hydraulic units are built in portable and stationary types, capacities 2 tons to 50 tons and larger. Models are available for riveting, punching, pressing, press-assembly, stamping, forming, multiple punching and riveting, and similar work involving the application of pressure. Write for Bulletin 53-MM giving complete information on all types.

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silicon carbide cup wheels on either end so that any combination of wheels desired can be employed. The cup wheels are mounted on steel backing plates and are adjustable along the shaft to compensate for wheel wear. The face of the wheels can be maintained close to the table and the wheels used down to the minimum of their abrasive diameter.

A standard, totally-enclosed, dust-proof motor is supplied with the grinder. The motor is equipped with a drum type on-off-reverse switch so that roughing and finishing of both right and left-hand tools can be done conveniently, with the wheels always rotating toward the cutting edge of the tools.

Hannifin Centrifugal Quenching Machine

A centrifugal quenching machine for use in the heat treating of many different kinds of circular parts including gears, tractor sprockets, tractor transmission gears, circular cams, discs, rings, bearing races, and so on, is now

being marketed by Hannifin Manufacturing Co., 621-631 S. Kolmar Ave., Chicago, Ill. In loading the unit for a quenching operation, a heated part is placed on a holding fixture in the lower part of the machine. The holding fixture is designed to meet individual requirements of the part to be quenched. A mandrel for centering may be provided, and a certain amount of control of quenching action may be obtained when desirable by suitable design of the fixture. The holding fixture is automatically operated and in closing provides a mechanical straightening effect or alignment of the heated part.

The holding fixture is surrounded by a circular quenching chamber which opens in two parts with the fixture and which, when closed, forms a circular vessel for the quenching fluid. When closed, the entire assembly of quenching chamber, holding fixture, and heated part is rotated by means of a motor drive. The quenching fluid is introduced at the outer edge of the revolving container or chamber.

Oil is introduced in controlled volume and at uniform and accurately controlled temperature. The rotation and

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Right—No. 618 Standard Type Rectangular Magnetic Chuck. Available in sizes 4 x 8 to 30 x 96.



STANDARD ROTARY CHUCKS

Style D (right) for thin, small work, as well as for general grinding. Style B (left) is ideal for work of average size and thickness. Four standard styles, all interchangeable.



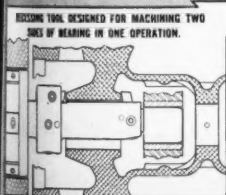
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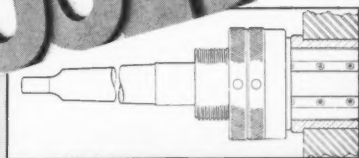
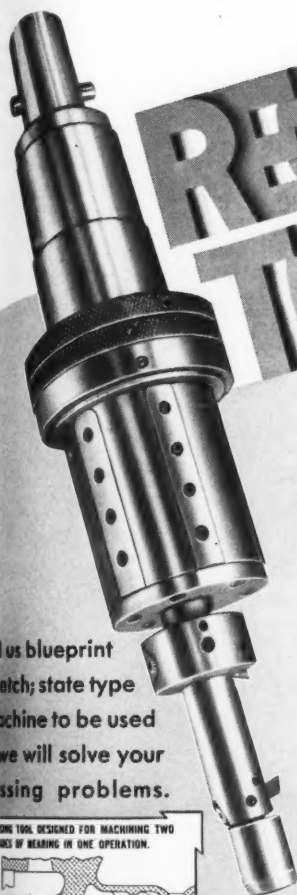
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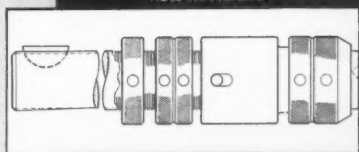
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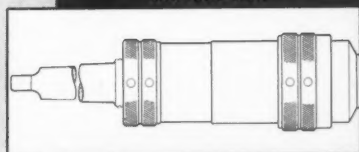
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HOLE IN PISTONS

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Part



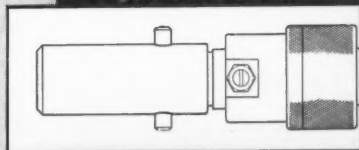
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IN CONDENSOR TUBE SHEET

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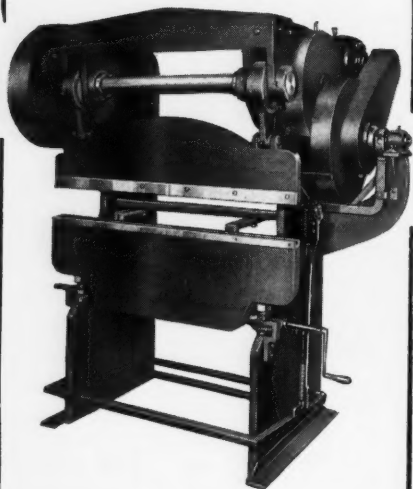


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Here's a profitable, economical brake ideally adapted for rapidly forming metal sections such as in stoves, refrigerators, soda fountains, steel cabinets, metal furniture, steel boxes, and a great variety of sheet metal specialties. Its variable speed drive operates from 17 to 50 strokes per minute. The No. 253 CHICAGO STEEL PRESS is accurate compact, and ruggedly constructed of highest quality materials.

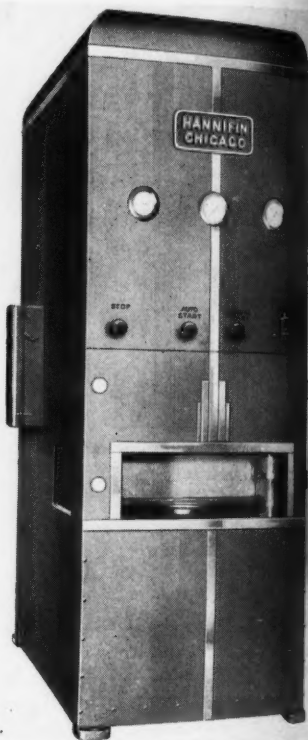
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the control of volume produce a revolving "doughnut" of quenching oil around the circumference of the quenching chamber. As the volume of oil is increased, the hole in the doughnut is reduced, and the quenching action takes place from the circumference of the part in toward the center. Oil flows out of the revolving quenching



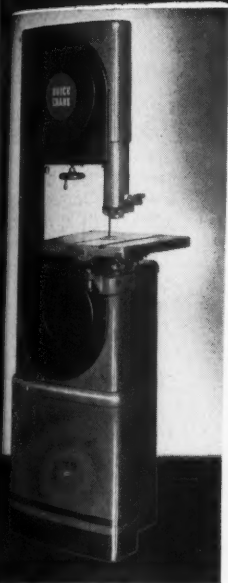
Hannifin Centrifugal Quenching Machine

chamber under controlled conditions so that uniformity of temperature is maintained by fresh oil.

Centrifugal quenching, it is claimed, not only eliminates distortion of circular parts but also permits control of the rate of quenching and the degree of quenching. The operating cycle is automatically controlled, with uniform timing, and may be adjusted to furnish the desired timing for handling parts of various types. Sectional quenching

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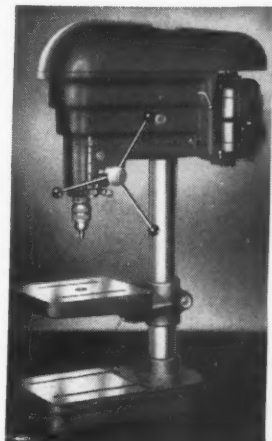
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Hanchett Special No. 36 Rotary Grinder

der controlled conditions can be easily obtained by allowing the center of the part to remain hot and unquenched, which results in differential hardness of the finished part.

Hanchett Special No. 36 Rotary Grinder

The Hanchett Mfg. Co., Big Rapids, Mich., has developed the special No. 36 rotary grinder shown herewith for

grinding wheel controlled by means of a large handwheel at the front of the machine. This control is said to permit very accurate positioning of the crankshaft to be ground.

Operated by a handwheel at the back of the machine is a micrometer screw stop which determines the correct grinding position for each succeeding crankshaft. A 175-gal. capacity coolant tank with motor-driven pump is located in the bed of the machine. Net weight of grinder, approximately 19,000 pounds.

use in grinding crankshafts of aircraft engines. The machine is fitted with a Hanchett-designed fixture for holding a crankshaft firmly so that the face where the counterweights are later attached can be ground square with the axis of the shaft to within 0.0004 inches.

The special No. 36 grinder is equipped with an 18-in. cylinder wheel having a special diamond dresser which gives a required radius to one corner of the wheel. The grinding wheel is driven by a 30 h.p. 900 r.p.m. built-in motor. The rotary fixture table is mounted on the carriage and its position under the

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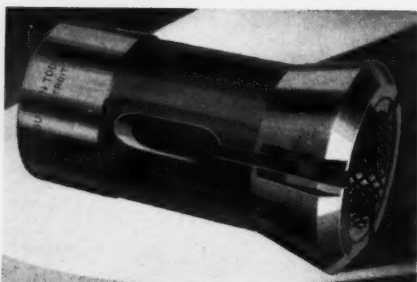
THE ALLEN MANUFACTURING COMPANY

HARTFORD, CONNECTICUT, U.S.A.

December, 1940

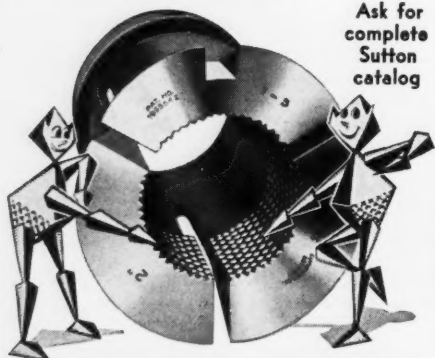
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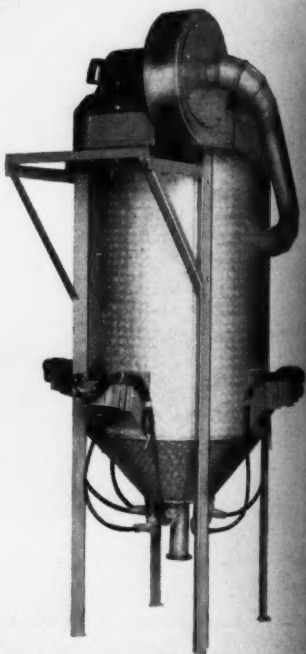


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A semi-automatic sandblast machine for use in the cleaning or finishing of various materials as well as for stenciling letters and designs on a wide variety of small or medium sized parts announced by Leiman Bros., 186-3 Christie St., Newark, N. J. The machine



Leiman Semi-Automatic Sandblast Machine

chine is completely self-contained, all work being performed under cover and without the discomfort of flying sand or dust particles. Around the machine are three motor-operated revolving tables, each having 6 or 12 holding fixtures. Each holding fixture is designed to hold one piece of work.

In operation, the holding fixtures of a revolving table are loaded and the table is revolved until a workpiece is introduced into the side of the cylindrical sandblast cabinet and positioned

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directly beneath two enclosed sandblast nozzles. After pausing beneath the nozzles for a prearranged time, the table rotates to the next fixture located on its top, thereby bringing another workpiece under the nozzles. This procedure is followed continuously until all workpieces have been brought beneath the nozzles for sandblasting. The same procedure takes place simultaneously at the other two revolving tables. An operator sitting in front of each revolving table removes a finished workpiece when the table comes to a standstill for the sandblasting of a workpiece on the opposite side of the table, replacing it with a new piece to be sandblasted. The removing and replacing of workpieces is repeated continuously.

The sandblast with its three enclosed nozzle stations of two nozzles each is cylindrical in shape and is equipped with a strong suction motor-driven dust collecting fan and dust separator. The dust collector maintains an in-drawing draft at each nozzle station, thereby preventing the outward escape of dust, a feature which is said to make the entire operation of the sandblast clean and comfortable. A cleanout section is

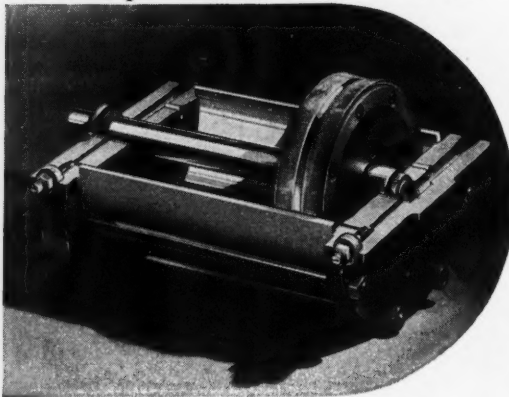
provided for the removal of all spent sand in the form of dust deposited in the cleanout section by the dust separator.

The nozzles of the Leiman Sandblast Machine are fed continuously with abrasive, whether the abrasive employed be ordinary sharp white sand or various grades of flint, emery, carborundum, or crushed or granulated steel. The abrasive is used over and over again until entirely consumed and reduced to the fineness of dust and deposited in the clean-out section. A supply of air is required to operate the sandblast machine, which can be arranged for use with practically any degree of pressure or any volume of air.

Ozalid Model "F" Whiteprint Machine

Ozalid Corporation, Johnson City, N. Y., announces a Model "F" whiteprint machine which is said to provide fast, economical, convenient, and efficient method for making positive type reproductions of engineering drawings, letters, charts, diagrams, bulletins, re-

adjustable "cushioned" air cylinder strokes



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The action of the cushioned part of an air cylinder stroke depends on variables that are, at best, difficult to determine. This condition can be offset in part by having this cushion action adjustable. Cushion adjusting screws operate to "slow" or increase the speed of the cushion action.

Furnished as standard equipment on T-J Cushioned Air Cylinders, these screws may be readily adjusted and locked in position on the job. Write for catalog 36-A to the Tomkins-Johnson Co., 620 N. Mechanic St., Jackson, Michigan.

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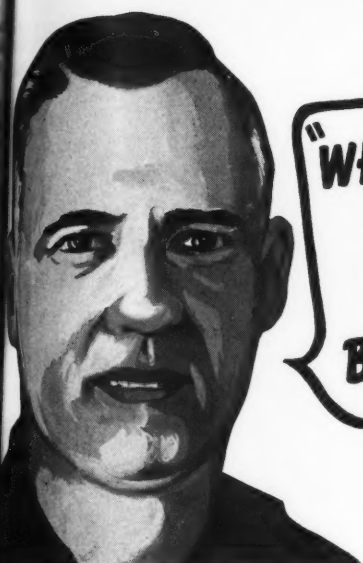
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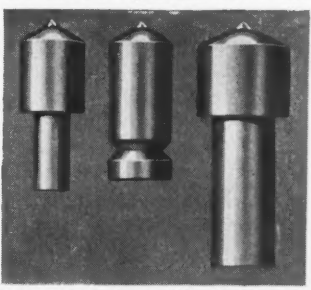


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"We've been using diamond tools for many years now and it's been my experience that it pays to deal with a company that has a background. For the past few years we've been getting our tools from Anton Smit & Co., Inc., an old concern that has been in the diamond-importing and tool-making business for more than thirty years. They know their diamonds."

With the growing demand for faster and more accurate cutting of new, hard materials, diamond tools have become popular for a wide variety of operations in industry. Diamond-tipped boring, milling and turning tools are used for precise fast work, especially on very hard or abrasive materials such as hard steels, rubber, fiber, plastics, etc.

For more than thirty years Anton Smit & Co., Inc., have been prominent importers of diamonds and manufacturers of diamond tools, also controlling the output of important diamond mining concessions. They carry extensive stocks of Bortz, Carbons, Ballas, Crushing Boart, Splint, Points, Powder, etc., in all sizes and qualities for various purposes, selected by experts. Parcels will be gladly submitted for examination upon request, either by mail or personal call. Send for illustrated folder and prices.



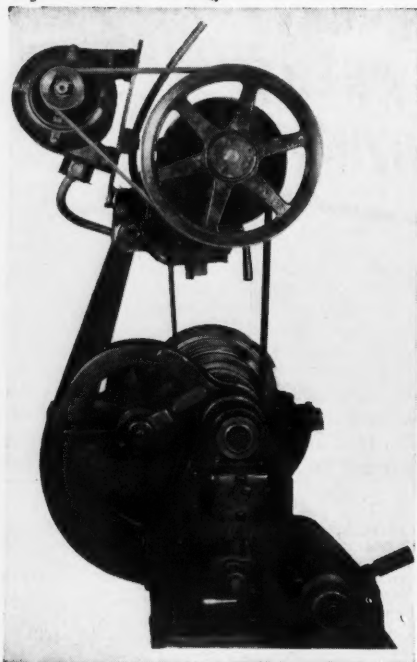
Left to right: Landis Nib, Norton Nib, Cincinnati Nib

ANTON SMIT & CO., INC.
STATE ST. (near Battery) NEW YORK, N. Y., U. S. A.

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THE RIGHT DRIVE FOR THE JOB



(Fig. 203)

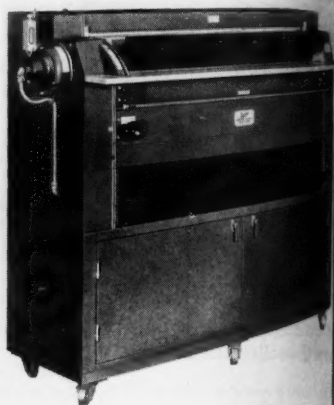
No one drive meets all your requirements advantageously. Be sure to choose the correct type drive to fit your need. We offer V Belt Drives, Gear Motor Drives, 4 speed Gear Box Drives. Send us a list of your requirements and get unbiased recommendations.

PRODUCTION EQUIPMENT CO.

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ports, and so on. The machine has a maximum printing speed of 56 in. per minute.

The light source used with the Model F machine consists of a new type high pressure mercury vapor lamp which uses 40 watts per inch with an actual length of 46 in. The lamp is said to give uniform distribution of light over the entire printing surface without flickering, thereby eliminating streak prints. In addition, there are no globes or carbons to change. The Model F lamp is guaranteed for 1,000 hours. According to the manufacturer, past per-



Ozalid Model "F" Whiteprint Machine

formance indicates that the lamp has a life of between 1,500 and 2,500 hours.

Additional features of the Ozalid Model F Whiteprint Machine include revolving glass contact which provides maximum light utilization and eliminates slippage, friction, static, and dragging of paper and tracings across stationary glass, thereby reducing wear on tracings; and an adjustable light shade which permits the operator to vary exposure without changing printing speed, thus making it possible to handle prints efficiently and maintain a smooth flow of work despite variations in transparency of tracings. Forced air cooling system provides even cooling of the lamp, a factor necessary for uniform light distribution. The cooling system is said to effectively prevent high temperature differentials between right and left sides and to

BARNES
BETTER Hack Saw
BLADES

in the PETROLEUM INDUSTRY



Photo courtesy National Petroleum News.

The petroleum industry ranks fourth largest in the United States. It employs more than a million men who collect an annual payroll that exceeds \$1,500,000,000. Petroleum creates one-third of all United States power and comprises one-eighth of all United States exports. Petroleum and its products make up one-third of all United States water-borne trade and total one-eleventh of all railroad freight.

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more production
per hour*

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DETROIT MICHIGAN

sure long life of the lamp. A special transformer corrects the power factor to 87.5 per cent, and a terminal board on the transformer is equipped with taps which permit adjustments for line voltage variations of from 200 to 240 volts. In this manner, correct voltage is said to be assured for maximum lamp efficiency in each installation.

Bates "Acromarker" Name Plate Stamping Machine

A machine for use in stamping complete name plates from metal strip and for impressing serial numbers, specifications, and other information into etched, embossed, cast and other types of metal, fiber and plastic name plates, to be known as the Bates "Acromarker" Name Plate Stamping Machine is now being offered by H. O. Bates, 251-257 N. Broad St., Elizabeth, N. J. According to the manufacturer, the machine is attractively designed and is constructed to precision specifications, thereby permitting all parts to work accurately and in perfect unison,



Bates "Acromarker" Name Plate Stamping Machine

ensuring the utmost ease of operation and marking accuracy.

The die wheel of the unit carries a complete alphabet and a full set of figures, including a dash, diagonal line, comma, and period. Each die is machine engraved and hand finished for



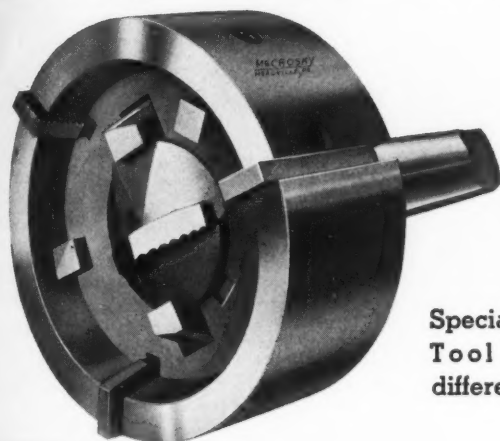
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MCCROSKY



Special-Purpose Jack-Lock Tool for performing five different operations.

WHETHER your job requires a husky head for boring one diameter or a tool specially engineered to combine operations, McCrosky's compact JACK-LOCK Wedge can be applied to a practical inserted-blade design that will improve performance on the job and reduce down-time for adjusting and regrinding.

For your reference file ask for JACK-LOCK
Bulletins Nos. 15-M and 15-F

MCCROSKY TOOL CORPORATION
Meadville, Pa.

MCCROSKY JACK-LOCK
SPECIAL PURPOSE TOOLS

... Engineered to the Job



December, 1940

MODERN MACHINE SHOP 153

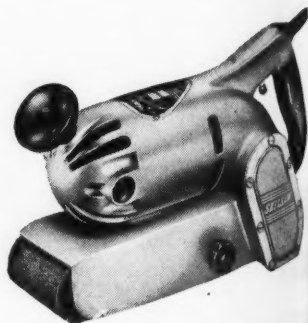
maximum accuracy, tempered and tested, and is assembled on the die wheel in a heavy duty manner. The holding fixture receives a name plate up to 8 x 4 $\frac{3}{4}$ in. and permits stamping within an area of 5 in. left to right x 3 $\frac{1}{4}$ in. top to bottom x 0.000 to $\frac{5}{8}$ in. thick.

The die wheel rotates on a double row precision roller bearing, thereby turning freely, and has a positive stop positioning for each character. The machine is unique in that at each stroke of the hand operating lever the table can be advanced a full space or any portion of a full space. This construction is said to be of particular advantage where varied spacing or the spacing of a narrow letter such as "I" is necessary. The powerful screw pressure principle permits the stamping of steel, stainless steel, and alloy steels.

The Bates AcromarkeR Name Plate Stamping Machine has a black wrinkle finish for attractive appearance and is equipped with a dull chromium plated table to eliminate glare. The machine is furnished in several sizes, special sizes being available on order.

Skilsaw "Zephyrplane Junior" Belt Sander

A lightweight, 2 $\frac{1}{4}$ -in. belt sander is known as the "Zephyrplane Junior" has been introduced by Skilsaw, Inc.



Skilsaw "Zephyrplane Junior" Belt Sander

5037 Elston Ave., Chicago, Illinois.

Among the features of the Skilsaw unit are a die-cast aluminum frame for lightness and strength, ball bearing

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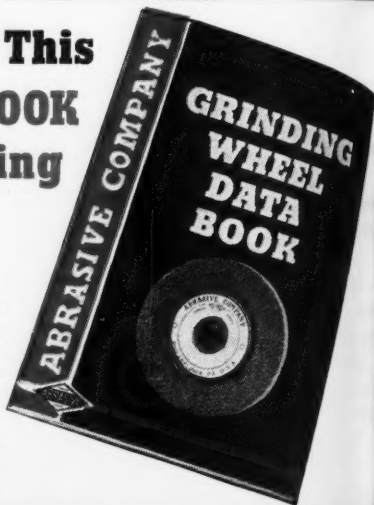
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4th REVISED EDITION

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TOOLS



ABRASIVE COMPANY

Division of Simonds Saw and Steel Co., Tacony and Fraley Streets, Philadelphia, Pa.

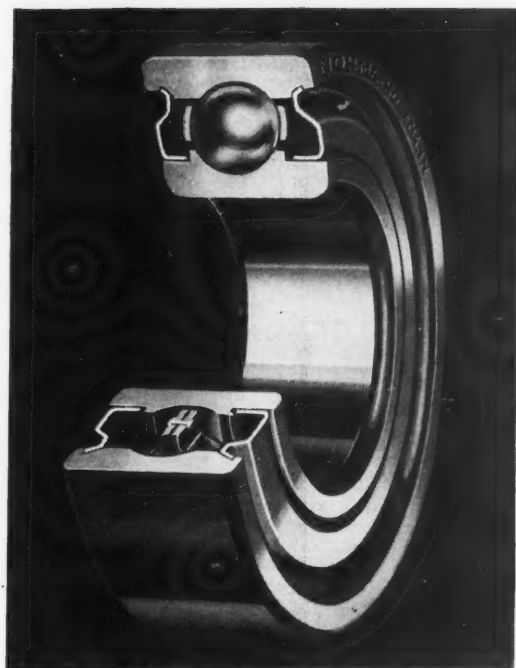
the Junior "9000-DD", with Double Metal Seals, here shown; also made as "9000-D" with Single Metal Shield.



Belt Sander

Illinois.
the Skilsaw
m frame
ball bearing

**LARGER
GREASE
CAPACITY
•
NO SEAL
DRAG**



IN "9000" SERIES (Feltless)

SELF-SEALED BEARINGS

Interchangeable in dimensions with felt seal bearings.

Employs simplified, inwardly extending, flanged metal shields which do not rotate and cannot "pull" other rotating seal parts.

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CAPACITY AND A MORE LASTING LUBRICANT SUPPLY.

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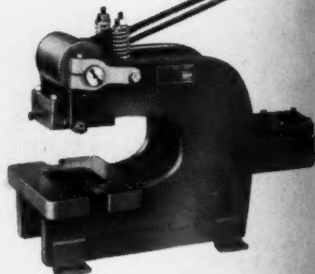
December, 1940

MODERN MACHINE SHOP 155

construction, and a powerful universal motor. Other features of safety and convenience are a Bakelite handle for cool comfort, a safe trigger-type momentary switch, and a patented "touch control" lever which permits quick changing of belts.

The belt travels at a speed of 600 s.f.m., is kept uniformly taut by a coil spring, and is easily centered by a simple adjustment. A variety of belts are available, adapting the tool for use on metal, for removing finishing materials, and for polishing.

The Zephyrplane Junior has been designed in such a way that uniform pressure is applied over the entire sanding area. Weight, 9½ pounds.



Leslie Hand-Operated Punch Press

Leslie Hand-Operated Punch Press

The Leslie Welding Co., 2943 Carroll Ave., Chicago, Ill., announces a hand-operated punch press which has no ram, ways, or slides but which is claimed to have the accuracy of a leader pin die set. The press is especially adapted to blanking or punching

small stampings or punching along the edges of large sheets. By means of this unit, a great variety of work not practical for power presses can be handled rapidly and efficiently.

A unique feature of the press is its leaf arm which maintains alignment and registration of punches and dies. The leaf arm is rigid except at its flexing

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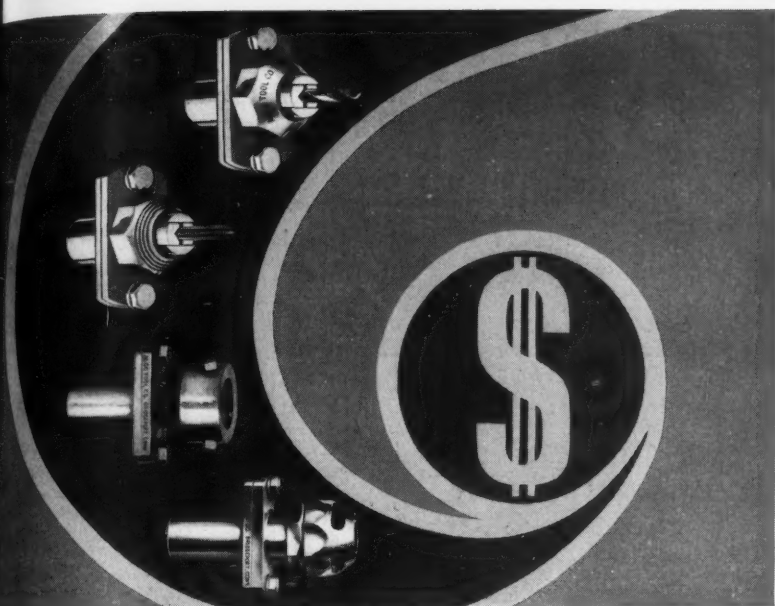
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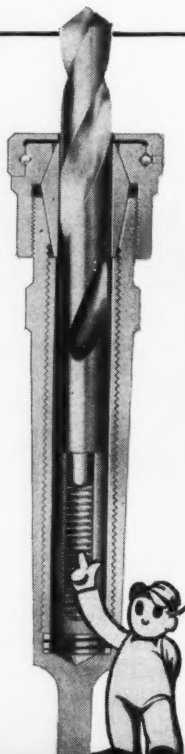
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point, a construction which together with the unusually wide bearing of the operating eccentric is said to eliminate the necessity of centering a load on the press punch plate.

Designed to accommodate most blanking punches ordinarily used on small power presses, the Leslie Hand-Operated Punch Press is equipped with a punch plate of 4 x 4 1/4 in. The clearance from punch plate center to frame is 6 in. The press is provided with a stroke of 7/8 in., a stroke adjustment of 1/8 in., and has a capacity for punching a 2-in. diameter hole through 14-gauge mild steel or 16-gauge 18-8 stainless steel.

Ohio B H U Speed Reducer

A small speed reducer designated the B H U has been announced by the Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio. Its dimensions of 5 1/2 by 3 in. and height of 5 1/2 in. are as



Ohio B H U Speed Reducer

to make the unit especially adaptable for use with fractional horsepower motors.

The B H U speed reducer is offered in three assemblies with output shaft projecting to right, to left, or to both right and left. Six stock ratios between 10 to 1 and 48 to 1 are available. The bronze worm wheel and hardened ground worm of the unit operate on Timken roller bearings. Torque capacity is 150 inch pounds.

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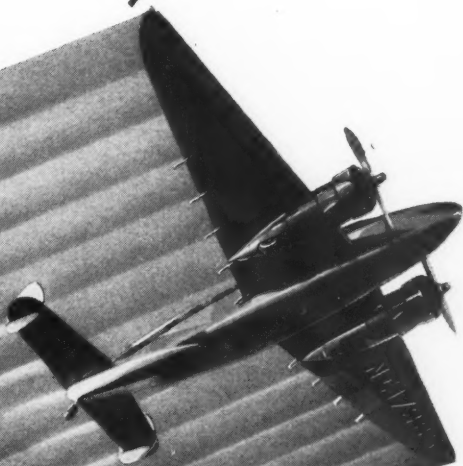
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Silence is Golden



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Quiet comfort and relaxation for the passengers is assured by the use of Felters Kapok Unisorb in this Lockheed "LODESTAR". Like Lockheed, most prominent airplane manufacturers use Kapok Unisorb—the lightest and most efficient sound absorber.



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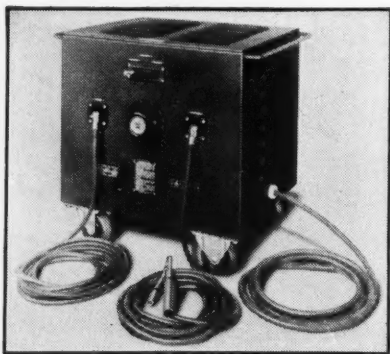
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F E L T E R S F E L T F U N C T I O N S

Allis-Chalmers Junior Size Weld-O-Tron Arc Welder

Allis-Chalmers Mfg. Co., Milwaukee, Wis., originator of the 5 to 75 ampere



Allis-Chalmers Junior Size Weld-O-Tron Arc Welder

Weld-O-Tron low current electronic arc welder for light gauge metals, has now

added a Junior size to its line for range of 5 to 40 amperes. The unit, especially designed for those plants already equipped with motor generator welders that handle currents as low as 35 to 40 amperes. Like the larger Weld-O-Tron unit, the Junior size welder supplies currents as low as 5 amperes and uses electrodes as small as $\frac{1}{8}$ and $\frac{3}{64}$ in. in diameter. It is especially suited to welding gauge steel from No. 32 to No. 18 and is capable of handling material as thick as No. 18 gauge.

The Allis-Chalmers Junior Size Weld-O-Tron Electronic Arc Welder consists essentially of a three-tube polyphosphor mercury vapor rectified circuit, thus eliminating all rotating parts, and making use of the company's Actron type of rectifier tubes which have been successfully employed in the large size Weld-O-Tron unit. The Junior size unit is said to combine all the advantages of a.c. and d.c. arc welding, and is light in weight and easily portable. Readily accessible controls and terminals are located on the front panel. Controls are of the dead front type and consist of a simple two-way switch for changing the polarity of the output to

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Flexible Shaft Machine

On many maintenance and production jobs, you can save time, ease the work and cut costs by using this handy truck-mounted STOW model—any place in your plant or yard. It's a glutton for work—because STOW's 65 years experience with flexible shafting guarantees unusual ruggedness and power capacity. Here's an all-around machine that can pinch-hit or do steady-duty with equal reliability. It will be a maximum earner for you—one you can't afford to be without in these days when every job is RUSH.

There are many other types of STOW machines. Write for catalog; helps you determine speeds, power ratings, mountings, etc., for your purpose.

STOW Manufacturing Co., Inc.

1 Shear St., Binghamton, N. Y.

Established 1875

INVENTORS OF FLEXIBLE SHAFTS

minals. A handwheel with easily read dial provides fine adjustment of the welding current.

According to the manufacturer, the constant current characteristic of the large Weld-O-Tron welder has also been given to the Junior size unit, thereby making the arc easy to start, easy to hold, and producing an optimum heat condition at the weld. The same characteristics are said to be obtained from minimum to maximum current settings.

Dayton-Rogers Model "D" Universal Pneumatic Die Cushion

The Dayton-Rogers Mfg. Co., 2830 S. 13th Ave., Minneapolis, Minn., is now marketing the Model "D" improved



Dayton-Rogers Model "D" Universal Pneumatic Die Cushion

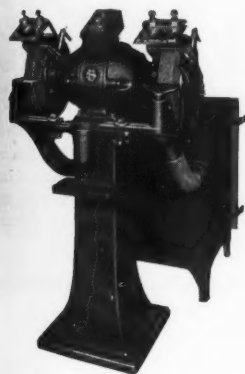
universal pneumatic die cushion shown herewith. The improved cushion is made in seven sizes from 6 to 14 in. has drawing capacities for deep drawing work from 2 to 8 in., and can be used with or without surge tank reservoirs. The cushion is supplied complete with a combination reducing regulating control valve and pressure gage, and may be mounted directly to the bottom side of a punch press bolster for all

draw ring and pressure pad control operations, or may be spaced away from the bolster plate to any desired distance to allow blanks or slugs to pass through the plate.

The correct height of the pin pressure pad is predetermined and maintained by a handwheel adjustable feature, thus compensating for bolster plate thickness variation, sharpening and grinding of dies, and a change of die design. The cylinder and piston are mounted on a section which serves as a pin pressure pad, thereby making it possible to drop the pin pressure area to the maximum of the drawing stroke by releasing the air pressure and shutting off the supply so that the pin plate stands out of the way for blanking and piercing operations when not needed. The design of the cylinder section automatically shields the die cushion so that no pierced slugs and other loose parts can come in contact with the cushion unit.

U. S. Dust Collector

The United States Electrical Tool Co., Cincinnati, Ohio, is now offering a dust collector which can be used with any



S. Model No. 500 Utility Motor-In-Head Grinder Equipped with Dust Collector

grinder or buffer having wheels up to 14 in. diameter, 3-in. face. The dust collector is a self-contained all-metal unit designed for use in removing dust and other abrasive particles from the workpiece. The dust and abrasive laden air is

Another Outstanding Advancement!

Again VICTOR leads—with the new VICTOR Unbreakable Special Flexible Hack Saw Blade. It is new in every way—new in looks, new in performance, new in steel, new in heat-treatment. Yet this outstanding blade sells at no advance in price.

PERFORMANCE

The new VICTOR Unbreakable Special Flexible is guaranteed unbreakable in use in a frame. It offers unusual flexibility with the toughness of an all-hard blade and no teeth strip-page.

METALLIC FINISH

An all-over protective metallic black finish (patented) prevents rust and provides immediate identification. Only the black blade with yellow marking is a VICTOR tungsten blade.

COMPLETE SPECIFICATIONS PLAINLY MARKED

The length, number of teeth, type, thickness, width and make are clearly printed in yellow on every blade. This helps in proper blade selection.

BETTER IN USE

Consider the features which make this new VICTOR blade better in use: unsurpassed flexibility, greater toughness, longer cutting, a protective finish and clearly marked. No wonder workmen are enthusiastic about it.

VICTOR introduced the "Moly" blade with the all-over gold finish—then introduced the modern metal box—now it pioneers again with a new flexible blade in an all-over metallic finish.

VICTOR HACK SAW BLADES

HAND* AND POWER, TUNGSTEN AND "MOLY"

*PACKED IN MODERN METAL BOXES

VICTOR SAW WORKS, INC.

Middletown, N. Y.

VICTOR UNBREAKABLE SPECIAL FLEXIBLE

10K1, 025 18 TEETH VICTOR SAW WORKS, INC., Middletown, N.Y., U.S.A.

1018SF

98

MODERN MACHINE SHOP 163

drawn into a filter cabinet, striking a baffle wall which directs the air downward to the bottom of the filter cabinet where heavy particles are deposited. The air is then directed upward through an all-metal filter pad and later returned to the room from the top of the filter cabinet. The suction fan and motor are located in the top of the cabinet and operate in clean air.

Shown in the illustration is a U. S. Model No. 500 Utility Motor-In-Head Grinder equipped with dust collector. The grinder has a push-button starter with overload protection, ball bearings enclosed in dust-tight housings, enclosed adjustable wheel guards, dust-proof anti-friction bearings, tool tray, and lift-out water pot.

Barrett-Cravens Model GX "Light Boy" Lift Truck

A multiple stroke lift truck having a capacity of 2,500 lb., to be known as the Model GX or "Light Boy," has been introduced by the Barrett-Cravens Co., 3250 W. 30th St., Chicago, Ill. The truck has a full lift of 3 in. which can



Barrett-Cravens Model GX "Light Boy"
Lift Truck

be obtained with either four full strokes or 13 short strokes. Each of the four wheels of the unit is equipped with ball bearings, and the front wheels are wide-spread for stability.

The Model GX Light Boy lift truck

MACHINE STEEL **4^{TO} 11 TIMES FASTER**



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by
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with new low-cost carbide cutting tools by TECO!

Step up productive capacity of your machines . . . save up to 30% floor-to-floor time . . . reduce fabricating costs all down the line with TECO Cutting Tools of new low-cost carbide. Production increases of 75% and more are not unusual. Let a Tungsten Electric engineer demonstrate how TECO's higher speed and longer tool life can speed up your machine capacity netting you a bigger profit.

TECO gives you all these cost-cutting advantages!

- 10 to 50 times as many pieces per grind.
- Floor-to-floor time cut as much as 30%.
- Tool life increased as much as 200%.
- Machines steel 4 to 11 times faster than high speed steel.

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(Melting Temp., 250° F.)

For securing punch and die parts, anchoring machine parts without the expense of a drive fit, engraving machine models, stripper plates, trucks, etc.

CERROBASE

(Melting Temp., 255° F.)

For reproducing master patterns, models for electroforming, engraving machine models, proof casting for forging dies, etc. Perfect reproduction of intricate detail.

CERROBEND

(Melting Temp., 158° F.)

Used as a filler in bending thin-walled tubes to small radii — easily removed in boiling water. Also used for templates in forming dies and for other purposes.

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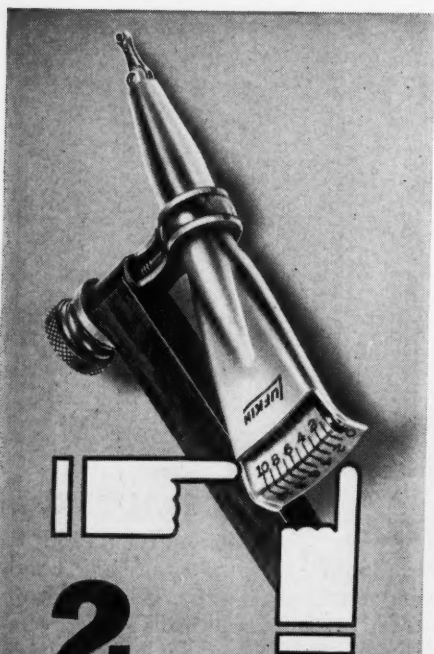
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Harry C. Kettelson, 329 N. Milwaukee St.

Jamison Steel Corporation, 508 Fourth St.

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Dominion Merchants Ltd., 180 Vallee St.



READING FACES

And those two reading faces offer one big reason why the Lufkin Universal Indicator is the outstanding Indicator of the day. No matter how the tool is set, you can take readings without resorting to the use of mirrors or awkward positions. Your dealer will show you. Write for Catalog.

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TAPES · RULES · PRECISION TOOLS

is made in sizes ranging from 30 to 100 in. long in multiples of 6 in., with either 6, 7, 9, or 11-in. diameter wheels and in widths of 18 and 24 in. A Model FX lift truck, known as the "Pay Boy," has the same general specifications and 3-in. lift as the Model G unit, but has a capacity of 3,500 lb. Both trucks have angle lift and spring handle hold-up.

Clark "Utilitruc" Lift Truck

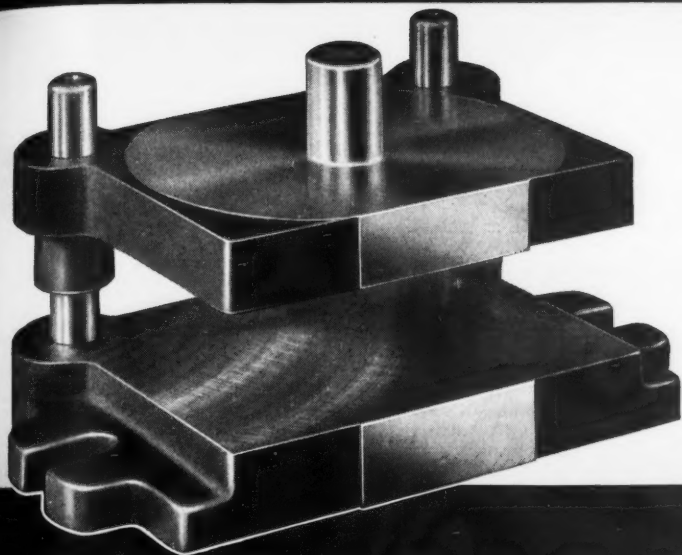
A lifting, carrying and tiering forklift truck designed to handle loads as heavy as 7,000 lb. and tier them in piles



Clark "Utilitruc" Lift Truck

ft. high or higher, to be known as the Clark "Utilitruc" Lift Truck, has been introduced by the Clark Tractor Division, Clark Equipment Co., Ball Creek, Mich. The truck is said to be particularly efficient in car loading and unloading operations, in utilizing the storage capacity to the full by high stacking, and in supplying production machines with materials and parts from storage. Gas-powered, it is capable of 24-hour continuous operation.

The Clark Utilitruc Lift Truck is made in several models, including straight lift, tilting, and telescopic lifting. The minimum height of the mast is 61½ in., thereby enabling it to clear low doorways, and the minimum capacity is 1 ton. The truck has heavy-duty tires with chisel points vary in length and are adjustable sideways on the



PRECISION

IS THE KNOWN QUANTITY
OF DEPENDABLE ACCURACY
THAT SAVES MONEY IN
DIE MAKING—AND
STAMPING PRODUCTION

WRITE YOUR DANLY BRANCH

DANLY MACHINE SPECIALTIES, INC.

2130 So. 52nd Ave. • Chicago, Ill.

513 E. Buffalo Street, Milwaukee, Wis.

36-12 34th St., Long Island City, N. Y.

990 E. Monument Ave., Dayton, Ohio

3913 North Broad St., Philadelphia, Penna.

1549 Temple Avenue, Detroit, Mich.

16 Commercial Street, Rochester, N. Y.

1745 Rockwell Ave., Cleveland, Ohio

Ducommun Metals & Supply Company, Los Angeles, Calif.; San Francisco, Calif.

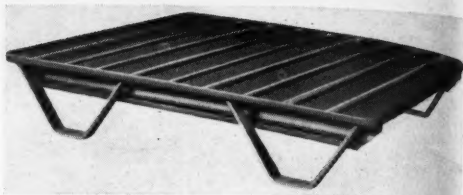
DANLY DIE SETS and DIE MAKERS' SUPPLIES

front plate. According to the manufacturer, the operator inserts the fingers under any cleated or uncleated load, lifts the load clear of the floor tilts it back 10 deg. in 1 sec. for easy riding, elevates it at the rate of 7 in. per sec., and tilts it forward 3 deg. in $\frac{1}{2}$ sec. for easy tying.

The Utilitrac is powered by means of a six-cylinder heavy duty tractor-type motor, travels at speeds from 1 to 7 m.p.h., climbs ramps under load, and has rear wheel steer and hydraulic brakes. The lifting unit is powered by means of an hydraulic vane type oil pump which is driven by a special direct drive from the motor and runs constantly at two-thirds engine speed.

Service "Steelwave" Skid Platform

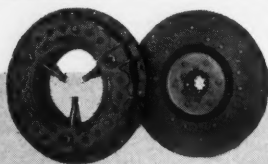
Illustrated herewith is the Service "Steelwave" Skid Platform which has been placed on the market by The Service Caster and Truck Co., 596 N.



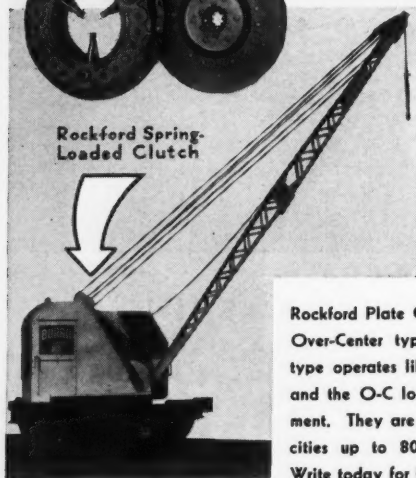
Service "Steelwave" Skid Platform

Brownwood Ave., Albion, Mich. Featuring a principle of "Strength Without Weight," the manufacturer lists as advantages: (1) great lightness and strength due to the use of light gauge metal corrugated two ways—crosswise in the deck and lengthwise at right angles to the deck in the side angles; (2) increased safety to loads and workmen due to rounded corners; (3) great resistance to wear from jamming, loading, and impact under heavy service; (4) no possibility of swelling, shrinking, warping, or buckling from atmospheric conditions; (5) unaffected by standing loads, and (6) elimination of splinters or broken top-boards.

The Steelwave skid is fabricated from



Rockford Spring-Loaded Clutch

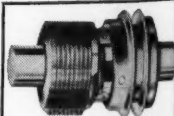


Rockford Clutches

Used in LOCOMOTIVE CRANES for Best Performance and Economy

The "Burro" Locomotive Crane illustrated has a Rockford Spring-Loaded Clutch controlling power delivery from its husky engine. Smooth in operation, efficient and economical. Rockford Clutches are ideal for a wide variety of industrial applications. Compact, they fit readily into machine designs.

Rockford Plate Clutches are built also in Over-Center type. The Spring-Loaded type operates like an automobile clutch, and the O-C locks in or out of engagement. They are supplied in many capacities up to 80 h. p. at 100 r. p. m. Write today for full information.



PULLMORE CLUTCHES

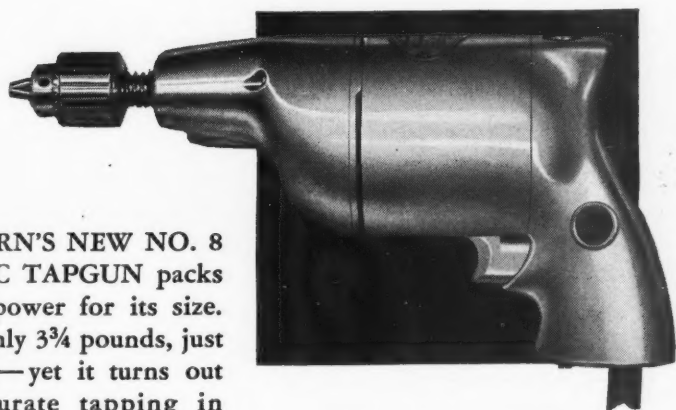
Multiple-Disc, single or double types; capacities up to 75 h. p. at 500 r. p. m. Investigate.

Rockford Drilling Machine Division

Borg-Warner Corporation 300 Catherine St., Rockford, Ill., U. S. A.

Taps 8 Holes

in the time it
formerly took to tap one!



VAN DORN'S NEW NO. 8 ELECTRIC TAPGUN packs a lot of power for its size. Weighs only $3\frac{3}{4}$ pounds, just $9\frac{1}{4}$ " long—yet it turns out super-accurate tapping in toughest metal *eight times* faster than hand-tapping! Capacity— $\frac{5}{16}$ " in cast iron, $\frac{3}{16}$ " in steel, $\frac{3}{8}$ " in brass or aluminum. Threads at 400 r.p.m.; backs out at 525 r.p.m. For larger work, Van Dorn's No. 22 Tapper taps up to $\frac{3}{8}$ " in cast iron, $\frac{1}{4}$ " in steel, $\frac{1}{2}$ " in

brass or aluminum. Both models reverse automatically when operator pulls backward, greatly reducing tap breakage. Ask your Van Dorn jobber for a demonstration on the job in your plant—or write to Van Dorn Electric Tools, 720 Joppa Rd., Towson, Md.

"Van Dorn"

(DIV. OF BLACK & DECKER MFG. CO.)

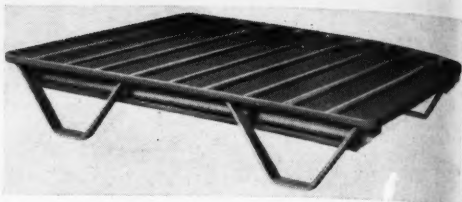
THE "RED" HEADED" PORTABLE ELECTRIC TOOLS

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Service "Steelwave" Skid Platform

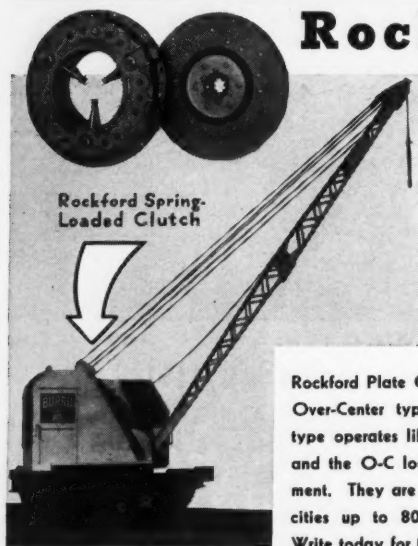
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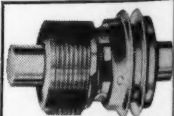
Rockford Spring-Loaded Clutch

Rockford Clutches

Used in LOCOMOTIVE CRANES for Best Performance and Economy

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PULLMORE CLUTCHES

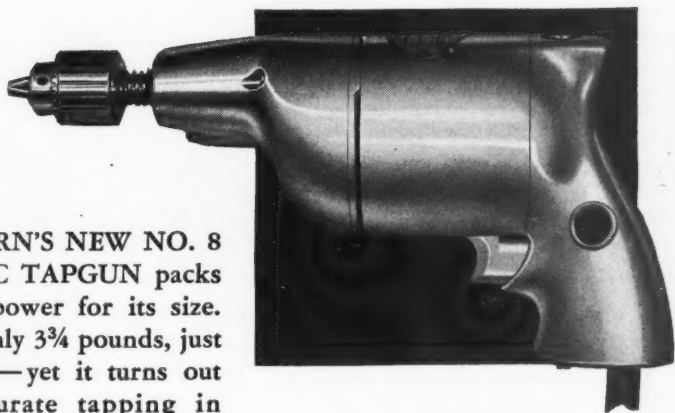
Multiple-Disc, single or double types, capacities up to 75 h. p. at 500 r. p. m. Investigate.

Rockford Drilling Machine Division

Borg-Warner Corporation 300 Catherine St., Rockford, Ill., U. S. A.

Taps 8 Holes

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formerly took to tap one!



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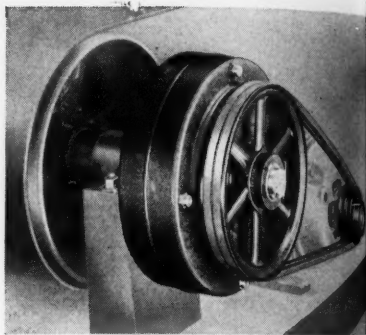
brass or aluminum. Both models reverse automatically when operator pulls backward, greatly reducing tap breakage. Ask your Van Dorn jobber for a demonstration on the job in your plant—or write to Van Dorn Electric Tools, 720 Joppa Rd., Towson, Md.

"Van Dorn"

(DIV. OF BLACK & DECKER MFG. CO.)

THE "RED HEADED" PORTABLE ELECTRIC TOOLS

light sheet metal, 16 to 12-gauge, according to required capacity. Deck and side angles are die formed and legs are of $\frac{1}{8}$ x $1\frac{1}{2}$ -in. flat steel. All parts are permanently fused by electric welding. Platform sizes for standard models range from 24 x 42 in. minimum to 36 x 72 in. maximum. Minimum clearance, floor to underside of deck, is $6\frac{1}{2}$ in.; maximum, 12 in. Either two or four-way lift truck entrance types can be furnished. Two standard capacities of 3,500 and 5,000 lb. are available; however, special sizes and capacities can be built to order.



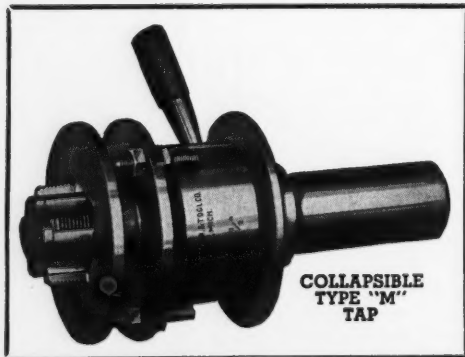
"American" Reduction Drive

"American" Reduction Drive

According to an announcement made by The American Pulley Co., Philadelphia, Pa., a completely new and very practical method of speed reduction has been afforded industry through the introduction of speed reduction equipment designated as the "American" Reduction Drive. The equipment consists of two major parts; namely, a helical-gear reduction unit which is mounted directly on the shaft of the driven ma-

chine, and a standard belt drive between the motor and the input shaft of the reduction unit. The equipment has a standard fixed ratio of 13 to 1 greater or lesser ratios being obtained by a primary belt drive. For example where an overall reduction ratio of 4 to 1 is desired, a belt drive is selected with a ratio of 4 to 1. This ratio, in combination with the ratio of the reduction unit, delivers the speed desired.

MURCHEY Collapsible Machine Tap



COLLAPSIBLE
TYPE "M"
TAP

A universal machine tap that can be used as a stationary tap with handle or as a rotating tap by removing handle. Instant trip at set point.

Chasers are rigidly supported and are hooked into tapered seat of the hardened and ground center pin to insure positive opening and closing.

MURCHEY MACHINE & TOOL CO. DETROIT MICHIGAN
ALL STYLES OF "SELF-OPENING DIE HEADS," & "BOLT AND PIPE THREADING MACHINES"

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er, 1940

8 Holes per Flange—
20 Parts per Hour—
with “Cleveland” Drills

Customers Say..
“CLE-Forge HIGH SPEED DRILLS
PRODUCE MOST HOLES PER
GRIND, MOST GRINDS PER DRILL”

In drilling 8 holes in the flanges of these universal joint parts, the manufacturer uses “Cleveland” Drills in a multiple-spindle machine and averages better than 20 parts per hour.

This Company had manufactured Drills, Reamers and other small tools for long years before multiple equipment came into general use. Nowa-

days, “Cleveland” Drills are engaged in a large share of all multiple-drilling operations the world over.

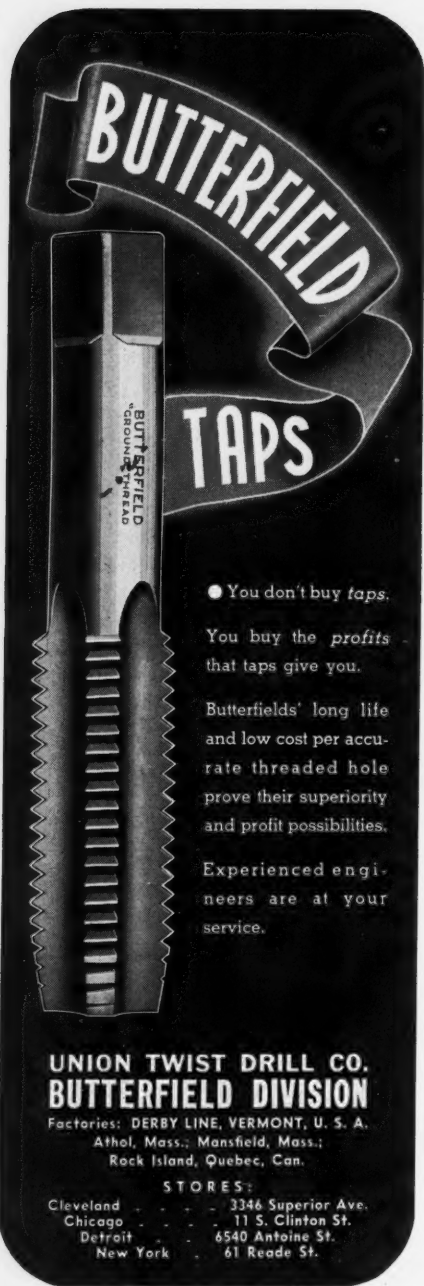
Are *your* drilling costs low enough? Better invite a “Cleveland” Representative to join you in a survey in your own plant. Write or telephone. No obligation.

We favor adequate Preparedness for National Defense

The **CLEVELAND** **TWIST DRILL COMPANY**
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES
30 BEADE ST. NEW YORK 9 NORTH JEFFERSON ST. CHICAGO 650 HOWARD ST. SAN FRANCISCO
4819 SECOND BLVD. DETROIT LONDON - E. F. BARRUS, LTD. - 35-36-37 UPPER THAMES ST. E.C.4



“CLEVELAND” DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU



BUTTERFIELD TAPS

● You don't buy taps.

You buy the *profits* that taps give you.

Butterfields' long life and low cost per accurate threaded hole prove their superiority and profit possibilities.

Experienced engineers are at your service.

**UNION TWIST DRILL CO.
BUTTERFIELD DIVISION**

Factories: DERBY LINE, VERMONT, U. S. A.
Athol, Mass.; Mansfield, Mass.;
Rock Island, Quebec, Can.

STORES:

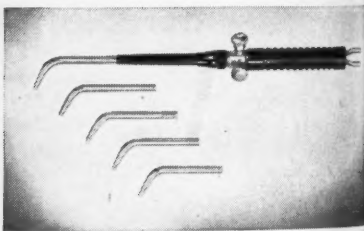
Cleveland	3346 Superior Ave.
Chicago	11 S. Clinton St.
Detroit	6540 Antoine St.
New York	61 Reade St.

Five reduction units, each with the same 13 to 1 ratio, cover all applications from $\frac{1}{2}$ to 30 h.p. In this manner, any desired speed between 11 and 215 r.p.m. can be obtained with standard equipment. For speeds slower than 11 r.p.m., special reduction units can be assembled.

Due to the fact that the American Reduction Drive can be mounted directly on a machine shaft with the utmost ease, no space or expense for special foundations is required. The shock absorbing action of the primary belt is said to completely protect the gears from any shock loads, thereby greatly prolonging the life of the reduction unit. Necessary maintenance attention is confined to infrequent lubrication. The overall efficiency of the drive when equipped with a tension-control motor base is said to closely approximate the 98½ per cent efficiency of the reduction unit.

Dockson "Featherweight" Welding Torch

The Dockson Corporation, 3809 Wash Ave., Detroit, Mich., has announced a "Featherweight" Aircraft Welding Torch which weighs only 5 lb. In addition to extreme ease of handling, features include a Duralumin tube and a fiber handle. The fiber



Dockson "Featherweight" Welding Torch

handle ensures a cool grip at all times while the conveniently located spring tension torch valves make it easy to adjust the torch with one hand during operation.

The Featherweight Torch is especially designed for top-speed production of sheet metal and light welding jobs. Supplied with the torch are six "smooth bore" copper tips which may be changed to fit the job.

with POLISHED SMOOTHNESS!

That's how this NEW DELTA MACHINE Cuts Copper, Brass, Aluminum

This new Delta Cut-off machine is designed especially for cutting copper, brass, aluminum and other non-ferrous metals with polished smoothness. It is equipped with a special high-speed steel blade and oiling device which feeds cutting oil to the blade. It leaves the cut perfectly smooth, thus eliminating additional finishing and polishing operations. At these remarkably low price levels you can actually get two cut-off machines for the price of one—machines that can be used for scores of jobs, and quickly pay for themselves in time and money saved!

Cuts These Materials With Polished Smoothness

Solid Sections: Soft Brass up to $1\frac{1}{2}$ " diameter; Half-Hard Brass, up to $1\frac{1}{4}$ " diameter; Aluminum, up to $1\frac{1}{2}$ " diameter; Aluminum Extruded Sections, up to equivalent of 2 sq. in.; Copper, up to $1\frac{1}{2}$ " diameter, or equivalent of 2 sq. in.; Magnesium (Dow Metal), up to $1\frac{1}{4}$ " diameter; Micarta and Similar Rods, up to $1\frac{1}{2}$ " diameter.

Tubular Sections: Soft Brass; Hard Brass, Aluminum, Copper, Dow Metal, Micarta and Similar, Tubing, all up to 2" diameter.

Has Many Special Features

This improved Cut-Off Machine is ruggedly constructed with heavy castings throughout—wide spaced Timken roller pivot bearings and double roller sealed-for-life bearings requiring no lubrication—powerful Texrope V-Belt drive—adjustable fence—accurately machined table. It is perfectly balanced, making for easy operation—cuts material at any angle and embodies unusual safety features such as a bulky chip guard, belt and wheel guards.



No. 1631
Non-ferrous
Cut-off Machine,
With blade guard,
belt guard and chip
guard.

Send for Special
Cut-Off Machine
Bulletin
giving full details
and prices on this
Delta Cut-off Machine
and all accessories.

DELTA MFG. CO.

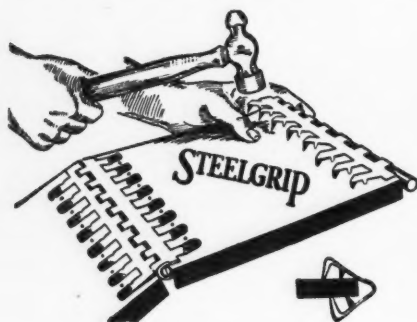
(INDUSTRIAL DIVISION)

East Vienna Avenue, MILWAUKEE, WIS.

Please send me special bulletin on the new Delta Cut-off Machine for non-ferrous metals. Also send latest Delta Catalog of Industrial Power Tools.
Name. _____
Address. _____
City. _____ State _____

Armstrong-Bray Steelgrip Lacing

Armstrong-Bray & Co., 304 N. Loomis St., Chicago, Ill., announces a new size box of its No. 45 Steelgrip Lacing. The



Armstrong-Bray Steelgrip Lacing

box is designated as the No. 45-T and contains four sets of lacing for 8-in. belts.

Heretofore the size No. 45 Steelgrip Lacing was packed in standard 12-in.

boxes only. To eliminate waste when lacing a $\frac{3}{8}$ -in. belt 8 in. wide, the No. 45-T box is now being offered.

Star Unbreakable Special Flexible Hack Saw Blade

A tungsten alloy hack saw blade which is said to possess the cutting qualities of all-hard tungsten blades but is also so flexible that it cannot be broken in use in a frame, to be known as the Star Unbreakable Special Flexible Hack Saw Blade, is announced by Clemson Bros., Inc., Middletown, N. Y. According to the manufacturer, the blade obtains its unique combination qualities through the use of a new tungsten alloy, heat treated by a newly developed process.

The blade bears an all-over patented green metallic coating for protection, lubrication, and identification. Full identification data, including dimensions and number of teeth per inch, are stamped in large dark blue type on the blade.

The Star Unbreakable Special Flexible

INTEGRITY!

T R & S Rivets are the last word in dependability and uniformity. And they're backed by the long-established integrity of the Tubular Rivet and Stud Company. So remember — for complete confidence in your production charts — specify only T R & S Rivets.

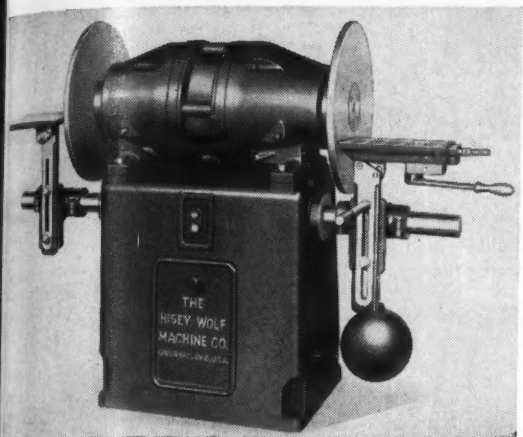
TUBULAR RIVET & STUD CO.

*World's Largest Manufacturer of Tubular
and Split Rivets*

WOLLASTON,

MASSACHUSETTS





Disc Grinding is Faster!!!

Milling and shaping operations are slow compared with Disc Grinding. New developments in the manufacture of abrasive discs have eliminated the disadvantages—no longer is it necessary to cement the disc on—discs can now be used 1 and 2 inches thick which bolt on to the machine. It will pay you to browse through your milling, shaper and planer department. Many of these operations can be speeded up on a Disc Grinder. Especially is this important now in the face of priority ratings and the long deliveries quoted on certain types of machine tools.

Disc Grinding also saves set up time and jig and tool costs. HISEY adjustable tables often require no more than an ordinary angle plate, or no jigs whatever for many squaring, surfacing and leveling operations.

HISEY tables are adjustable 45° in either direction and have ample area. They are made in both plain and universal lever feed types.

HISEY Disc Grinders are totally enclosed, have special thrust bearings and made in various styles from 1 to 10 H. P. capacity.

WRITE FOR CATALOG No. 50D

THE HISEY-WOLF MACHINE CO.
CINCINNATI, OHIO

"HALLOWELL" Shop Furniture of Steel

• "Hallowell" Stools and Chairs — built for lifetimes of economical, work-producing comfort — the logical answer to the seating problems of industry are now being used in thousands of plants.

WRITE
FOR
CATALOG!



Fig. 1334
Pat. Applied For

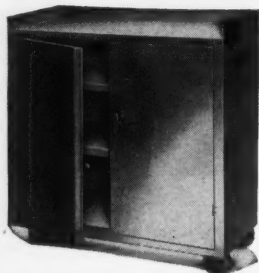


Fig. 1748

• Keep your tools safely under lock and key with this handy "Hallowell" Steel Tool Stand. This stand rolls easily right to the job . . . saves steps, time and money as well as providing tool protection. Write for details and prices.

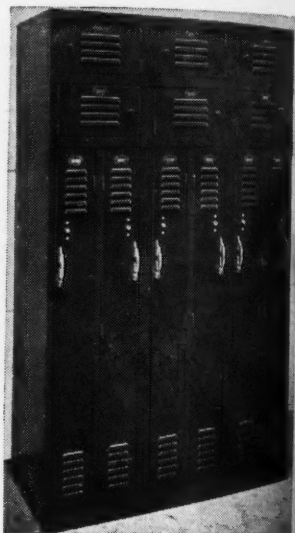
**STANDARD
PRESSED STEEL CO.**
JENKINTOWN, PENNA.

Boston	Chicago
Detroit	St. Louis
Indianapolis	Box 556 San Francisco

ible Hack Saw Blade is available in all standard hand sizes and pitches and is packed in Star hinged lid metal boxes 72 blades per box.

Penco Two-In-One Steel Lockers

A steel locker designed for use in close quarters or any installation where a saving in floor space is an important consideration, to be known as the



Penco Two-In-One Steel Lockers

Penco Two-In-One Steel Locker, has been brought out by the Penn Metal Corp. of Penna., 36 Oregon Ave., Philadelphia, Pa. The illustration shows a group of three lockers providing ample accommodations for six persons.

The Penco Two-In-One Locker is fabricated from first-grade, heavy gauge furniture steel to prevent sagging or warping. Frame members are spot welded for strength and rigidity, and according to the manufacturer, there are no rough edges, faulty handles, hinges, latching devices, or other annoying defects. All nuts and bolts used in the assembly are cadmium finished to resist corrosion, and rubber bumpers are used at contact points to prevent damage from banging doors.

HERE'S YOUR GUARANTEE OF SATISFACTION IN TAPS



The name "JOHN BATH" on a tap is your assurance of uniform hardness, keen cutting edges and dependable precision thread form, lead and angle.

"Ground from the Solid After Hardening"

BATH'S skilled engineers use patented equipment to grind directly into the ideally hardened, solid steel blank. In this way they produce threads of perfect accuracy and absolute uniform structure from the thinnest teeth edge to the core of the top.

Give BATH Taps a trial—they'll save you money.

JOHN BATH & CO.
WORCESTER • MASS.

The two-in-one locker is 15 in. wide, 21 in. deep, and 73½ in. high, including a 1½ in. base, and is divided into two coat compartments, each of which is 7½ in. wide, 21 in. deep, and 54 in. high. Each compartment is provided with two single prong coat hooks and a coat rod. The two hat compartments are each 15 in. wide, 21 in. deep, and 9 in. high. Flat key locks are furnished for each coat compartment door which, when opened, automatically unlocks a hat compartment.

Hygrade 100-Watt Fluorescent Lamp

The need for a large size fluorescent lamp which would extend the advantages of fluorescent lighting for general illumination to large areas has led to the development of the Hygrade 100-Watt Fluorescent Lamp which is now being marketed by Hygrade Sylvania Corp., Salem, Mass. The lamp is 60 in. long, 2½ in. in diameter, and is available in white. It will soon be available in daylight also.

The base of the Hygrade 100-Watt

Fluorescent Lamp is Mogul Bi-Pin (similar to present Hygrade lamp base but larger) and the rated average life is 2,000 hours. The lamp has an initial lumen output of 44 lumens per watt and is said to produce an average of 880 lumens per foot.

Fafnir "Mechani-Seal" Transmission Units

The Fafnir Bearing Co., New Britain, Conn., announces a series of transmission units incorporating Fafnir "Mechani-Seal" Ball Bearings. The transmission units include ball bearing pinion blocks, flange cartridges, and cylindrical cartridges.

The streamlined, light series units offer two outstanding features; namely, efficiency of the Mechani-Seal construction, and ease of application made possible by the Fafnir Wide Inner Ring design, with self-locking collar. The units are locked to the transmission shaft with a finger twist, no machining, shaft shoulders, adapters, or lock nuts being required.

The Mechani-Seal bearing, employing

SHEAR-CUT HIGH SPEED END MILLS

Here's a complete line of
Single and Double End Mills.

They save time and money.
Specify Progressive Shear-Cut End Mills.
Write for catalog and prices.

PROGRESSIVE TOOL & CUTTER CO.
2345 WOLCOTT ST. FERNDALE, MICH.

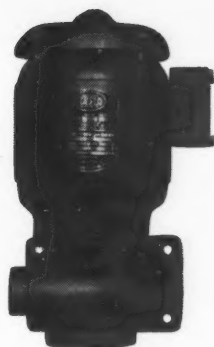


CENTRIFUGAL COOLANT PUMPS AND BY-PASS OIL RELIEF VALVES

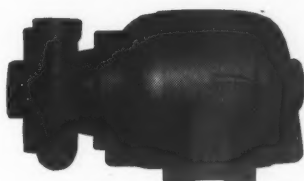
The ideal, efficient units for installation where space is limited.

These compact, quiet units can be depended upon for long life and high efficiency.

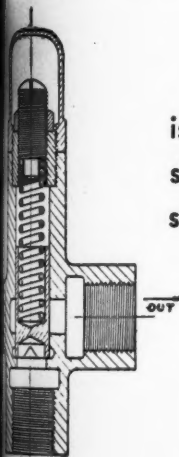
Flexibility in installation is assured through ability to provide for exactly the position of discharge required.



Symbol FVM
Vertical Type



Symbol FHM
Horizontal Type

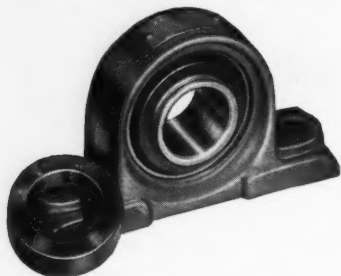


The Fulflo By-pass Piston Type Oil Relief Valve is made in either cast iron or bronze, with pipe sizes from $\frac{1}{4}$ " to 2" and are suitable for pressures up to 350 lbs. They are equipped with either brass, hardened steel, or stainless steel pistons.

*(Complete Information of the
"Fulflo" Line Sent Upon Request)*

THE FULFLO SPECIALTIES CO., INC.
LANCHESTER OHIO

close tolerances for its efficiency, is said to impose no friction or drag. Two steel plate shields form the innermost members and are tightly fitted to the bearing outer ring. An outer corrosion-



Fafnir "Mechani-Seal" Pillow Block

proof steel plate shield pressed on the inner ring clears the inner plates by definite but close tolerances and acts as an efficient slinger. After prolonged tests in a dust box "torture chamber," the Mechani-Seal bearing is said to have shown no contamination whatsoever of the grease within it.

Fafnir Mechani-Seal Transmission Units, which are interchangeable with the separately sealed Fafnir units which preceded them, are available in Types LAK (pillow block), LCJ (flange cartridge), and LC (cylinder cartridge).

Cleveland Tramrail Raise-Lower Cab Carrier

The Cleveland Tramrail Division, The Cleveland Crane & Engineering Co., Wickliffe, Ohio, is announcing a newly designed Tramrail carrier with raise-lower cab. This equipment is available in two general types. One type provides for the raising and lowering of cab and load together, and the other for the raising and lowering of cab and load independently of each other. Which type to use is contingent upon the service and materials to be handled.

With a raise-lower cab unit, one operator can handle all operations involved in moving materials with an electric cab-controlled overhead Tramrail system, such as attaching load to crane hook, detaching, and operation of

The DEFENSE PROGRAM has created a great demand for efficient machine tools

FLEXOID SPEED CONTROL

PRIORITY orders are now needed for the purchase of NEW machine tools, therefore USED machines will be in great demand.

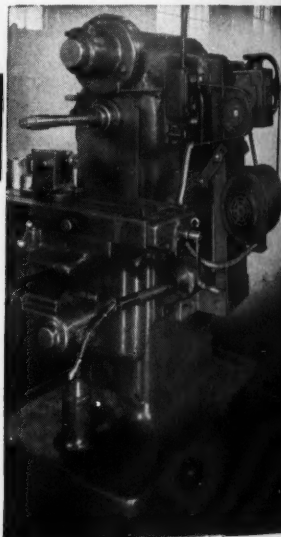
We suggest motorizing all tools with Flexoid Speed Control Units. They will convert every type and size of line shaft driven lathe, shaper, milling machine, etc., to modern individual motor drive for more efficient and economical Production.

Both FOUR and EIGHT Speed Units can now be furnished. All speed changes are easily controlled by a single handwheel. (Remote Control if desired.) Finest materials used throughout.

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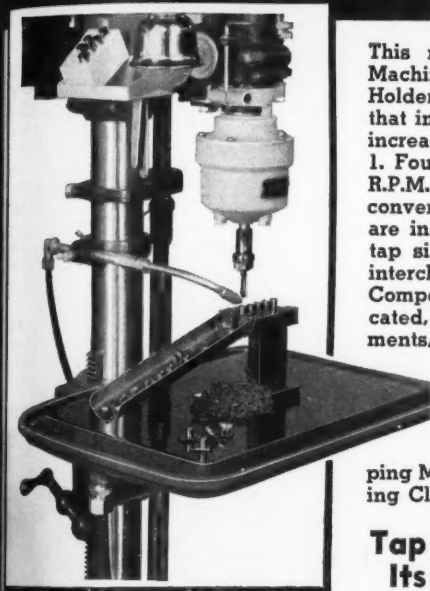
The Smith Power Transmission Co.

1545 EAST 23rd ST., CLEVELAND, OHIO



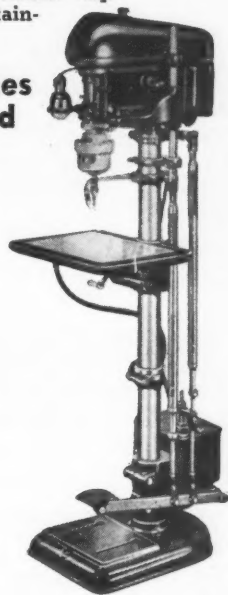
Tapping Problems Solved

With This New Tapping Machine!



This new Procnier Universal Tapping Machine with the latest Tru-Grip Tap Holder, embodies revolutionary features that increase tapping output—and greatly increase tap life. These features include: 1. Four speeds, ranging from 390 to 2050 R.P.M. efficiently handle jobs for which conventional high speed tapping machines are inadequate. 2. One machine handles tap sizes from No. 2 to $\frac{1}{2}$ " through two interchangeable heads. 3. Extra long Spiral Compensating Springs conveniently located, with wide range handscrew adjustments, maintain pre-set tap feeding and reversing pressures **INDEPENDENT OF OPERATOR.** (Close-up view shows the tapping of steel anchor nuts for aeroplane with the Procnier Universal Tapping Machine maintaining Class A Fit.)

Tap Establishes Its Own Lead



The new Procnier Universal Tapping Machine is so designed that it actually allows the tap to establish its own lead. There is nothing more accurate than the tap itself in thread-cutting—so maximum tapping efficiency is attained where the tap is free to establish its own lead in cutting the thread.

This means more accurate tapping with every thread uniform, greater production with less spoiled work and less tap breakage. Send coupon for illustrated bulletins giving full details and prices, on Procnier Universal Tapping Machines, High Speed Tapping Head, and Tru-Grip Tap Holder.

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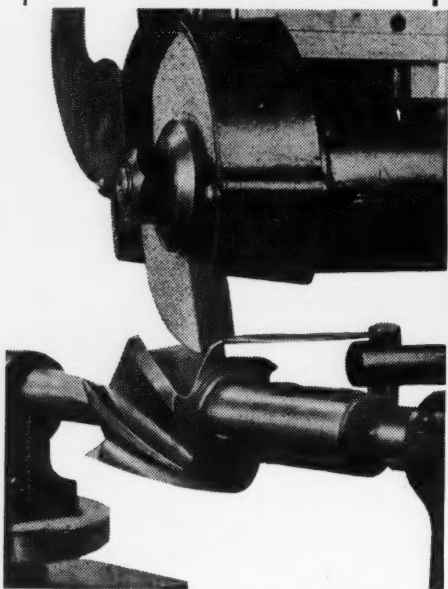
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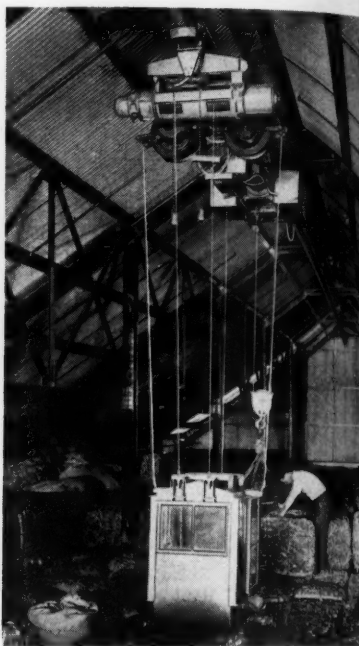
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the Tramrail unit. If the materials are of such a nature that a lifting fork is necessary, one operator can also handle the entire job.

The unit illustrated handles unwell loads of cork. The cab and load hook are operated independently of each other. During the day shift when large quantities of cork are required to keep up the production, the cab is kept in the upper position firmly attached to



Cleveland Tramrail Raise-Lower Cab Carrier

the Tramrail carrier. Three men are then employed; one for attaching loads and the third for operation of the Tramrail unit. During the night shift when the demands for materials are not so great, the cab operator alone through the use of the raise-lower cab can handle the entire job. The unit shown has a vertical travel of 40 ft. for both cab and hook. Equipment can be furnished for operation from much greater heights if desirable. The load hoist, cab hoist, and carrier are all motorized and controlled from the cab

materials are
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also handle
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load hook
of each
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Good Hoists

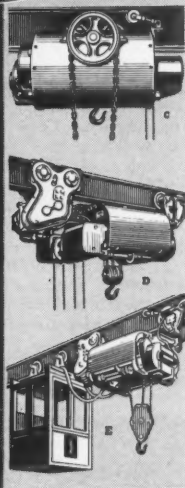
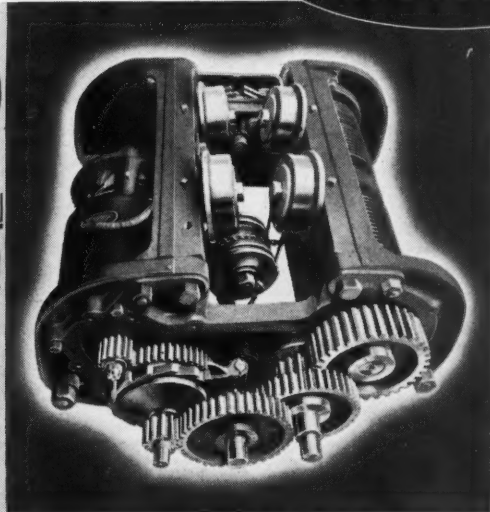
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HOISTS



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HOIST FOR EVERY PURPOSE

Hand Separation Type.
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WEIGHTS FROM 1/2 TO 12 TONS



GOOD FOR ALL PURPOSES

You called the Lo-Hed Hoist the low headroom hoist
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Only 10% have bought a Lo-Hed because it is the
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open-view on this page that the Lo-Hed Hoist has
every worthwhile feature a good all-purpose hoist
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OUR A-E-CO PRODUCTS:
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the cab

The cab is arranged so that it cannot be traveled until it is in the high position.

For handling heavy kegs, sacks, and so on, in and out of a stockroom or warehouse, the use of a lifting fork and pallets often provides the best and most efficient means. The fork may be connected to the cab so that both move together, thus enabling the operator to always be abreast of the load. In this manner, the operator is said to have no difficulty in threading the fork under the pallets of materials.

Tramrail units having the cab connected to a lifting fork or other similar material handling devices are generally arranged so that they may be traveled even when the cab is suspended at a considerable distance below the carrier. This enables the operator to steer the lifting fork into or away from the load on the floor or on top of a pile with precision and as the situation demands.

A salient advantage of the Cleveland Tramrail Raise-Lower Cab Carrier is its great aid to safety. According to the manufacturer, piling height is not limited and the operator is just as safe at 60 ft. above the floor as at 10 ft. The danger of heavy kegs and other

materials falling on the operator is said to be eliminated, and the highest tip of the pile, it is claimed, can be piled just as level and firm as the tier resting on the floor.

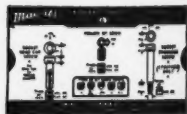
The Cleveland Tramrail Raise-Lower Cab Carrier is especially suitable for the handling of kegs, drums, rolls of paper and cloth, lumber, sheet steel, cement, and many other products. It is available for operation at various heights and speeds as required.

G-E "Tri-Clad" Polyphase Motor

As a result of a broad survey of the changing requirements of industry, General Electric Company, Schenectady, N. Y., announces a line of polyphase induction motors in integral horsepower sizes to conform with new industrial trends, purposes, and practices. To be known as the Tri-Clad Motor, the motor has three principal features: (1) better mechanical protection through the use of a cast iron box-type frame, (2) better electrical protection made possible by a new type of magnet wire known as Formex, and (3) better protection against operating

MAC-ITS Save on Production, Maintenance and Design!

Stronger, more accurate screws can end many tie-ups, cut costs all along the line. When you design to take advantage of them, Mac-its give you all these savings in 16 standard items. For complete details on the only complete line of heat-treated alloy steel screws, call your Mac-it distributor or write for Catalog 40.



FREE! Write Dept. Z for celluloid slide scale, giving all dimensions on standard Socket Head Cap Screws—Hollow Set Screws—Stripper Bolts.

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HIGH SPEED DRILLS

9" Cutting Flute

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Size	Length Overall Inches	Length of Flute Inches	Our Net Price Each
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7/32	12	9	1.60
1/4	12	9	1.75
9/32	12	9	1.85
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13/32	12	9	2.75
7/16	12	9	3.00
1/2	12	9	3.25

Orders for 12 or more assorted sizes will take
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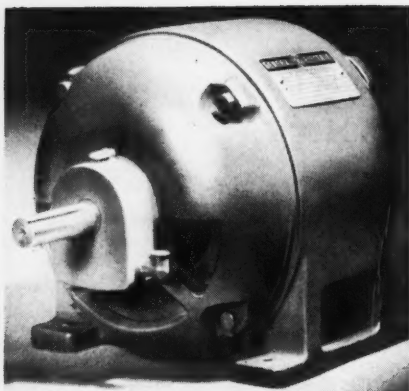


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G-E "Tri-Clad" Polyphase Motor

wear and tear through a new design of slip bearings. The design features streamlined appearance, more complete protection than heretofore available except in especially enclosed machines, major advances in the insulation of current-carrying parts, and improved bearing design and lubricating arrange-

ments. It also incorporates the aluminum rotor and pressure relief system of greasing for ball bearing motors. The motor operates well within the standard 40 deg. C. temperature rise.

The new magnet wire, Formex, is tough, heat and solvent-resisting magnet wire which makes possible the elimination of paper and cotton covering and other fibrous materials. Motor windings are further protected by application of an approved synthetic resin varnish and a covering coat of Glyptal Red. The result is a tough space-saving insulation, highly resistant to heat, moisture, and mechanical abuse.

The sleeve bearings are designed for the proper proportion of length to diameter, thus maintaining the deflection of the shaft inside the bearing at a value less than the thickness of the oil film.

A wide conduit box with unusually large working space simplifies installation in close quarters. The box may be mounted in any one of four positions. The stator is reversible, allowing the conduit box to be located on either side and up or down on side wall mounting.

LIMA GEARSHIFT DRIVE *Streamlined*



Any lathe or other machine tool operating on one to 25 H.P. can be brought up to full modern productive capacity by the LIMA Gearshift Motor Unit. Eliminates counter shafting and cone pulleys. Two models — drive for independent motor, and direct drive which has motor built in. Speed changed instantly by a flip of the convenient shift lever.

The LIMA Gearshift Drive is designed to give the manufacturer's recommended speeds on any machine tool. Any of the four forward speeds can be reversed instantly with a drum control.

**AS LOW AS
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Equipped with hand wheel for rotation of machine spindle. All steel heat-treated gears run in bath of oil. Compact, streamlined design. Guaranteed one year. Write for specifications!

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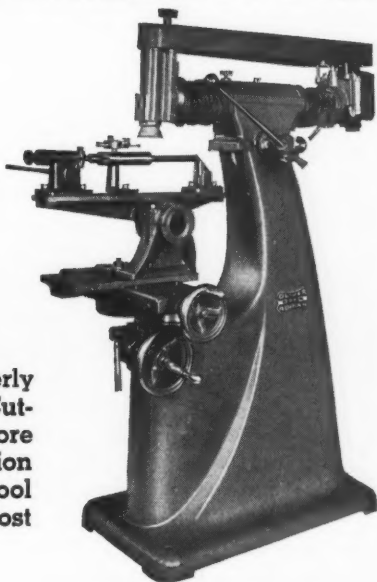
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Oliver Tool Conditioners assure properly
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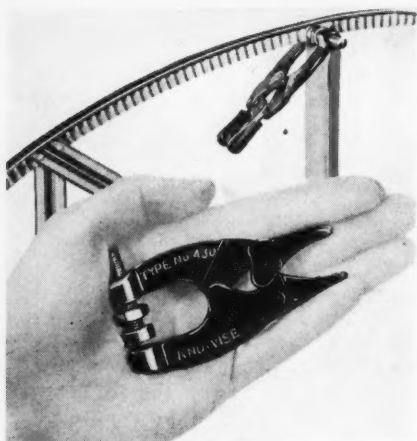
Oliver of Adrian offers you a complete
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Automatic Twist Drill Grinders, Face Mill Grinders, Tool and Cutter
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Cut illustrates the new Universal
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tools—simple to set-up, easy to
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Knu-Vise Midget Toggle Plier

Knu-Vise Midget Toggle Plier

Designed primarily for the aircraft industry, the Knu-Vise Midget Toggle Plier shown in the illustration herewith

has been placed on the market by Knu-Vise Inc., 16839 Hamilton Ave., Detroit, Mich. The plier is 3 in. in overall length, weighs 3 oz., and is made from 10/20 SAE steel, hardened and tempered. Although so small, the leverage obtained by pressing the two handles between the finger and thumb is in excess of 90-1, thereby enabling the operator to grip small aircraft parts with great pressure.

According to the manufacturer, the Knu-Vise Midget Toggle Plier has been found especially useful in the aircraft industry for clamping formed sections to airplane skins and for clamping templates to sheets of aluminum when marking out the sheets.

Holliday "Speed Case" Steel Plate

A low carbon open hearth steel plate designated as "Speed Case" is announced by W. J. Holliday & Co., Speed Case Plate Division, Hammond, Ind. According to the manufacturer, Speed Case machines without tearing and is usually machined without resorting to

PRODUCTO UTILITY PRESS

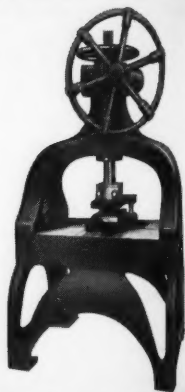
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For shearing punches and dies in the tool room.
For separating punch and die holders on large liner pin die sets.

For assembling and aligning punches and dies.
As a powerful straightening press or arbor press.
For short broaching operations, pressing out pins from die sets, disassembling spindle or shafts from press fits in bearings.

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Makers of PRODUCTO Die Sets and Accessories.
Shipments from stock at Bridgeport, Detroit, Mich., and Cleveland, Ohio.

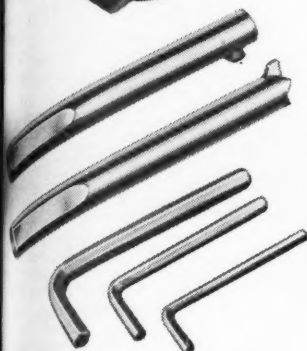
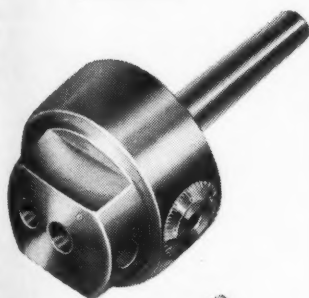


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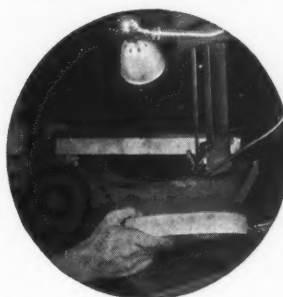
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Top illustration shows a DoAll cutting out holes on flask dowels in aluminum match plate for metal patterns.



In the circle armor plate is being cut at the rate of 40 square inches per hour.

Fastest Precision Method

For cutting internal and external shapes from any metal up to 10" thick. DoAll replaces shaping, milling and lathe work with enormous savings of time, labor and material.

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Vernon
11" PRECISION
Shaper

Designed for speed, accuracy and versatility, the Vernon 11" Shaper will handle work usually accomplished only by machines costing several hundred dollars more.

OUTSTANDING FEATURES:

1. Variable drive provides infinite speeds ranging from 50 to 150 strokes per minute with no changing of belts or pulleys.
2. Helical gear and pinion assure maximum smoothness and power.
3. Universal table and 7" swivel vise with steel jaws.
4. Front-end support for absolutely vibrationless rigidity.

The Vernon 11" Shaper has automatic, easily adjustable cross feed; enclosed anti-friction thrust bearings for long life; hand-scraped ways; and alloy rocker arm. Motor, $\frac{1}{2}$ h. p., 1,750 r. p. m.; 60 cy. Bench model as illustrated or mounted on floor pedestal with fully enclosed variable drive. Ask for Bulletin.

The Vernon Line of
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COMBINATION VERTICAL MILLING
MACHINES & JIG BORERS, & 11" SHAPERS**

MACHINERY MANUFACTURING CO.

3636 IRVING STREET, VERNON, LOS ANGELES, CALIFORNIA

the use of cutting oils. The machine surface is frequently said to be so smooth that grinding or polishing is unnecessary. Because of the free machining qualities of the plate, tool life is claimed to be greatly increased and regrinding kept at a minimum. Speed Case can be machined at speeds up to 150 to 250 surface feet per minute.

Because of the manganese throughout the matrix of the steel, Speed Case is said to be ductile and resistant to impact and abrasion. It has high shear



Portion of "Speed Case" plate broken to show the depth of case and the tough fibrous core. The top shows the result of buffing after machining.

and compression values and a tensile strength of 62,000 to 72,000 lb. per sq. in. Hot rolled Speed Case plate $\frac{1}{2}$ in. thick shows a Brinell hardness of from 141 to 156. The characteristics of the plate are said to make it ideal for forging, cold forming, pressing as well as machining. The plate can also be readily welded. A typical analysis of Speed Case reads: carbon 0.20, manganese 1.25, sulphur 0.250, phosphorus 0.02 maximum, silicon 0.02 maximum.

Speed Case derives its name from the fact that it can be rapidly carburized. Penetration is deep with a uniform case of from C62 to C66 Rockwell combined with a tough core that averages from C15 to C21 Rockwell. Speed Case is recommended for bearing, bolster, wear

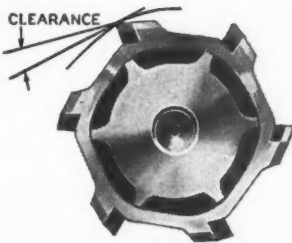
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YOU CAN EXPAND THIS REAMER .0001" EASILY AND QUICKLY

... rapid adjustment to .0001" is possible in a Staples reamer due to its patented tapered expansion plug. The range of expansion is from .004" in 1/4" dia. reamer to .020" in a 1 1/2" dia. reamer. Due to construction, each expansion of the reamer further enlarges the blades, presenting in effect, a new cutting edge. It is not unusual to find Staples type Carbology reamers expanded several times without a regrind and without affecting the finish of the hole. This enables you to hold accurate sizes with a minimum servicing of the reamer. Sizes from 1/4" dia. to 1 1/2" dia. Write for leaflet. Sold through Carbology Company or direct from . . .

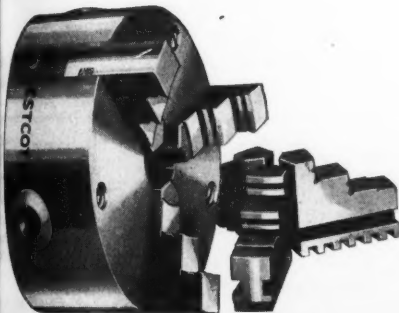
STAPLES TOOL & ENGINEERING Co.
Cincinnati, Ohio



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PATENTED.**
Re-sizing automatically
provides clearance
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STAPLES REAMERS CORE DRILLS

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Semi-steel body . . . 2 sets of jaws . . . Mounted to spindle by adapter . . . Heat-treated jaws, scrolls and pinions . . . Centers within .003" total indicator reading.
Six sizes: 4", 5", 6", 8", 10" and 12".

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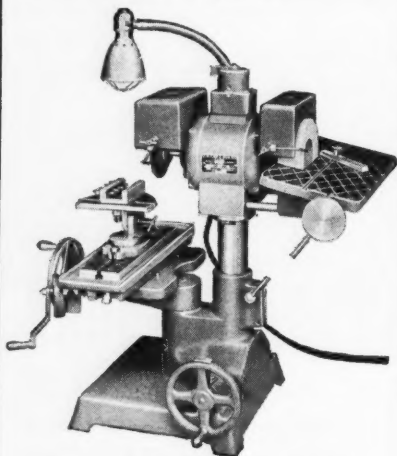
and stripper die casting, metal forming roller and other dies, machinery tables, bed plates, composing tables, jigs and fixtures, gears, sprocket wheels, molds for plastics, rubber, and fiber, and so on.

"Speed Treat," a medium carbon, open hearth, high tensile, free machining steel is also available. A typical analysis of Speed Treat is: carbon 0.40-0.50, manganese 1.10-1.45, phosphorus 0.02 maximum, sulphur 0.20-0.30, silicon 0.03 maximum.

Both Speed Case and Speed Treat are

available in plates of standard dimensions or can be obtained flame cut to size or sketch and ground top and bottom, or ground and polished to close tolerances. Cut-outs, flame cut, can also be made. Speed Treat plates when flame cut, are treated to eliminate the hard edge.

CARBIDE TOOL GRINDER



The Lee Carbide Tool Grinder is designed for the complete maintenance of carbide-tipped tools. It answers the needs of increased industrial production using high-speed cutters. Investigate its need in your plant, today!

Ask for Bulletin CTG40-12M.

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Aberdeen, South Dakota

CS Stamped Wing Nuts

The line of one-piece stamped wing nuts made by Central Screw Company, Dept. 62, 3523 Shields Ave., Chicago, Ill., has been expanded to meet

the growing demand for special sizes and shapes demanded by the trade. The illustration shows the Type 16 wing nut with special low wings, the Type 3 standard pattern wing nut, and the Type 10 broad base wing nut, the latter being especially designed to eliminate need for a washer and ensuring an adequate self-bearing surface on assemblies where it is necessary to bridge grooves or openings. The rounded head of the broad base CS Wing Nut eliminates the scoring invariably caused by



Type 16
Special Low Wings



Type 3
Standard Pattern



Type 14
Special Broad Base

CS Wing Nuts

SCHAUER Speed Lather



FOR LAPPING
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2 Speed Motor
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Nuts

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6 Low Wings

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4 Broad Base

Wing Nuts

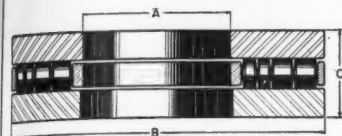
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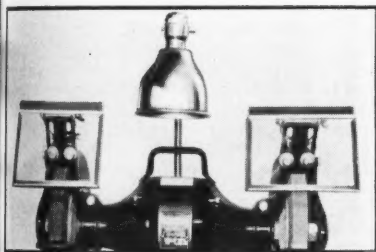
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ROLLER THRUST BEARINGS

• Made with flat seats and in a variety of self-aligning types.
These bearings are especially adapted for heavy loads at slow or moderate speeds.

Standard sizes are shown in our general catalog, sent upon request.

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338 FURMAN ST., BROOKLYN, N. Y.



"PRODUCE FASTER"

Keynotes Today's Tempo

VIMCOLIGHTING will help do that job with its localized high intensity light focused on the spot. Follow the example of **Black & Decker Mfg. Co.** and other users who install VIMCOLIGHTS on their machines for better sight. Vimco has types and styles for any use. What is your problem?

VIMCOLIGHT

VIMCO MANUFACTURING CO.
111 CHENANGO ST. BUFFALO, N. Y.



FACILITIES DOUBLED!



... That We May SERVE YOU BETTER

For the second time in less than three years, Modern Collet's plant facilities have been expanded . . . now to double the floor area and capacity of recent months.

Constantly progressing in production methods that have created a world-wide demand for Modern Collet products and services, we now have the type of plant which will make possible increased production efficiency, even finer manufacturing quality and more prompt deliveries from every department.

We invite you to visit our enlarged and now extremely modern plant and general offices . . . and to investigate the services that we are now able to offer you as the result of our much greater capacity.

MODERN COLLET AND MACHINE CO.

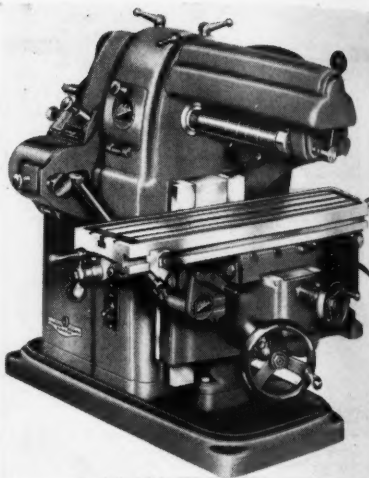
401 Salliotte St. Ecorse, Mich.

heavy pressure or changed position of ordinary wing nuts.

CS Wing Nuts are said to be of uniform and sturdy construction, free from burrs or sharp edges. All types are said to be available in plain bright finish or plated to meet any particular need.

Atlas Bench Milling Machine

Designed for improved efficiency, versatility, and economy on small-piece milling, the Atlas bench milling ma-



Atlas Bench Milling Machine

Having difficulty holding tolerances?



Demand the **ZIEGLER** ROLLER DRIVE Floating Holder for **TAPS and REAMERS**

- AUTOMATICALLY compensates for machine spindle misalignment, eliminating over-sized or bell-mouthed holes.
- Helps produce unbelievable accuracy on both new and old equipment.
- Furnished with male or female taper, straight, threaded or special shanks to fit any machine used for tapping or reaming.

W. M. ZIEGLER TOOL CO.

1926 Twelfth Street

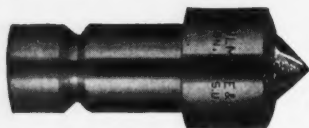
Detroit, Michigan

chine shown in the illustration has been placed on the market by Atlas Press Company, 1146 N. Pitcher St., Kalamazoo, Michigan.

The miller handles the full range of milling operations from heavy slabbing and facing to light end milling, keyways, finishing and layout work. Three types of table controls are available: standard screw feed, rapid-production lever feed, and the new "Changeomatic" for instant selection of automatic table feeds. A wide range of spindle speeds provides correct surface speeds for all types of work and cutters. Swivel vise, rotary index table, indexing centers, and coolant system are available.

Specifications are as follows: table working surface, 4½ x 18 in.; longi-

INDUSTRIAL DIAMONDS



FOR TRUING ALL
SIZES OF WHEELS

SPECIAL SHAPED
DIAMONDS FOR
FORM GRINDING

PROMPT REPLIES
QUICK SERVICE



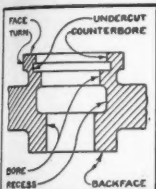
F. F. GILMORE & CO. 112 DARTMOUTH ST.
BOSTON, MASS.

The Precision Universal Tool Head

THE ONLY BORING TOOL THAT IS ADJUSTABLE
WITHOUT STOPPING THE MACHINE.

A truly Universal Tool Head that has rendered all types of the once popular wrench-adjusted "offset" or "eccentric" boring tool entirely obsolete, as it brings all adjustments under absolute micrometric control of the operator at all times and at all speeds without stopping tool or machine. By a mere turn of the wrist the cutting tool is instantly adjusted to "tenths" for boring, or fed continuously across or into the work for facing or recessing.

It is not only the fastest and most accurate boring tool in existence, but is far more than that as it also faces, counterbores, turns outside diameters of hubs and bosses, recesses, mills flat surfaces and slots, undercuts, back-laces, trepans and does countless "headache" jobs that wrench-adjusted boring tools cannot do because they cannot be adjusted while running.



Eight operations performed at one setting on hub on awkward two-ton casting in 72 minutes. No special tools or set-ups required. Let us solve your difficult problems. Write for Bulletins.

ADJUSTABLE
While Running!



Absolutely Different

THE PRECISION TOOL COMPANY
P. O. BOX 155, BROOKLYN, NEW YORK

Cables: PRETOOL-NEW YORK

Tel. MAIN 4 - 1064

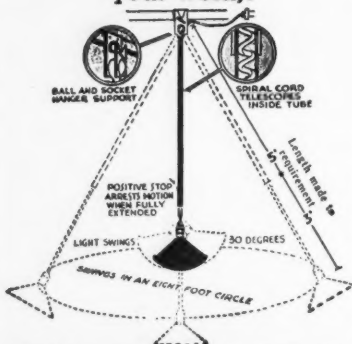
**SPEED
UP PRODUCTION**
with
"ROTABIN"
**Get to your tools and
supplies quickly**

Production demands are greater than ever. Each link in the production chain must be smooth and fast down to the tool or stock room. Sluggish circulation here can form a bottleneck to production.

Make your tools easily accessible with Rotabin. Your tool or stock room will work smoothly and profitably with Rotabin and thus help step up production. Write today. No obligation.

THE FRICK-GALLAGHER MFG. CO., Wellston, Ohio

Light—Universal Movable Stays Put; best for machine shop and drafting room to avoid glare or head strain. (Fastened above your work).



Push it up, pull it down, swing it out, swing it around, it stays put.

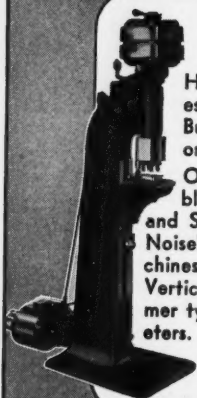
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J. ZAGORA MACHINE & GEAR CO.

1325 South Mint St.

Charlotte, N. C.

GRANT Noiseless Spinning Riveters



2 to 6
Spindles

Head rivets from smallest to 3/16" diameter. Built with automatic trip or foot operation.

Other types include Double-Spindle Horizontal and Single-Spindle Vertical Noiseless Rivet Spinning Machines, and Single-Spindle Vertical Hammer type Riveters.

WRITE
FOR
FOLDER

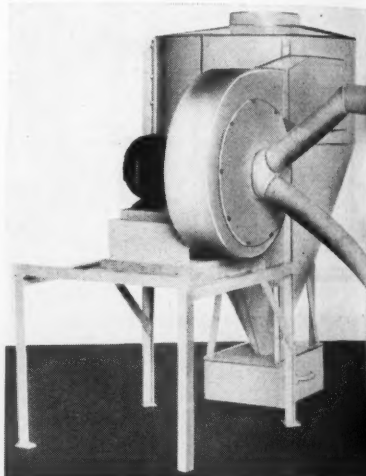
The GRANT MFG. & MACHINE CO.

96 Silliman Ave.
BRIDGEPORT, CONN.

tudinal table travel, 12 in. (10 in. with "Changeomatic"); vertical table travel, 6 in.; arbor diameter, 7/8 in.; overall dimensions, 25 1/2 x 32 1/2 x 22 in. high; motor recommended, 3/4 h. p., 1740 r. p. m.; Timken tapered roller bearings for spindle.

Leiman Self-Contained Dust Collector

Dust can be drawn from the top and from the bottom of a grinding wheel or buff simultaneously by the use of the



Leiman Self-Contained Dust Collector

motor-driven self-contained dust collector now being offered by Leiman Bros., Inc., 101-W-2 Christie St., Newark, N. J. The collector prevents the escape of dust no matter in what direction the workpiece may be manipulated.

The branched piping may be varied to lead each branch to a separate dust hood over a separate wheel or buff, thus collecting dust from two wheels at the same time. The unit is completely self-contained, making it possible to move it from one location to another at any time. The unit can be supplied for use with one or two wheels up to 24 in. in diameter and of average width or for the collection of dust from any other kind of dust-creating operation. The unit is intended for use in any

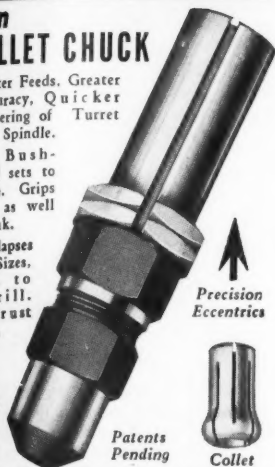
AUTOMATIC SCREW MACHINES

Precision COLLET CHUCK

Faster Feeds. Greater Accuracy. Quicker centering of Turret and Spindle.

Eliminates Bushings. Drill sets to any length. Grips on Flutes as well as on Shank.

Collet collapses 1/32" Sizes. 1/2" dia. to No. 80 Drill. Positive thrust screw stop.



Precision
Eccentrics



Collet

Patents
Pending

ERICKSON STEEL CO.
& BESSEMER CLEVELAND, OHIO

C - L - E - A - N

YOUR MOTORS, TOOL ROOMS, LATHES
SUPPLY ROOMS, PANEL BOARDS
GENERATORS, MACHINERY, ETC.

THE QUICK, THOROUGH AND ECONOMICAL WAY

With a CLEMENTS

CADILLAC

Portable Electric

BLOWER &
SUCTION
CLEANER



1 H.P.
2 Speed Model
Illustrated

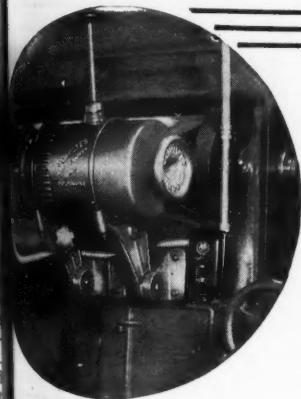
You can eliminate costly delays, costly breakdowns and costly repairs—Let us tell you how—Ask about our 10 DAYS FREE TRIAL OFFER.

Write Today for Complete Information

CLEMENTS MFG. CO.

6655 S. Narragansett Ave.

Chicago, Ill.



A No. 2 B & S Milling
Machine equipped with
Schultes 4 Speed Drive.

NEW

ALL-HELICAL GEARED 4 SPEED SCHULTES UNIT

Instant Reversibility

4 SPEEDS FOR ANY JOB on Milling
Machines, Shapers, Lathes, Drill Presses,
Planers, Punch Presses, Sloters, etc.

The SCHULTES 4-Speed Drive operates
each tool at the best speed for the job . . .
with finger-tip control.

Schultes-equipped machines are independ-
ent units that can be located at the most
advantageous points on production lines.
All moving parts enclosed . . . no belts to
change by hand . . . fast . . . flexible . . .
economical. Write for further details.

WESTLOF TOOL & DIE CO. 430 Bellevue Ave.
Detroit, Michigan

line of manufacture on materials of metal, glass, plastics, Bakelite, wood, or other materials.

Halco Universal Hi-Speed Milling Head

Illustrated herewith is the Halco Universal Hi-Speed Milling Head which has been brought out by the Halco Products Co., 14230 Birwood Ave., Detroit, Mich. The head is designed for high speed milling, drilling, boring and counterboring on any angle, and is equipped with a sturdy, hardened spindle ground to precision limits with a No. 7 B & S taper.

The Halco Head is adaptable to all standard mills and has a capacity of $\frac{1}{8}$ to $\frac{1}{2}$ -in. diameter. It is provided with a draw bar for Weldon type holder or collets and is equipped with three radial thrust precision flush ground ball bearings mounted in a heavy cast iron housing. In addition, the head has a sturdy cast iron dovetailed slide with 4-in. travel and positive locking stop. An adjustable gib is provided to compensate for wear.

The head has a heavy $\frac{3}{4}$ -in. ground



Halco Universal Hi-Speed Milling Head

screw with 10-pitch Acme thread, fitted with a heavy bronze nut for accuracy. A ball thrust end bearing and adjusting screw are provided to take up backlash. For vertical travel, the head is fitted with hardened spiral gears.

The Halco Universal Hi-Speed Milling Head

AMERICAN SWISS Files of Precision

Comparative tests prove that American-Swiss Files give greater "file-age." One survey made among file users showed that American-Swiss files last 25% to 50% longer than others, and many concerns have written us that these files produce better results at lower cost.

Buy from our Distributor

Only the Best are good enough



Look for this trade mark on every tang. Over 2500 different types, sizes and cuts.

American Swiss File & Tool Co.
ELIZABETH, N. J.

RED-E CENTERS WON'T LOSE THEIR TEMPER

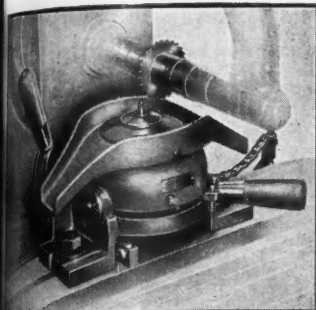
because they have High Speed ends. They will outwear ten tool steel or carbon centers.

Write for sizes and prices



HIGH SPEED CENTERS.

THE READY TOOL CO.
BRIDGEPORT



DEARBORN Automatic Chucking and Indexing Fixture MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN

70 S. CLIFF ST. • ANSONIA, CONN.

Mark It Quickly with a **NUMBERALL**

Made with 1 to 10 wheels. Stamp in perfect alignment. Shank for Hand or Press Stamping. Platform for stamping Name Plates and other small articles.

No. 45
Platform

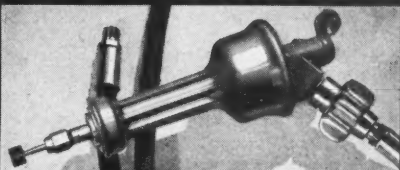


NEW Quick Set Machine. One wheel can be turned quickly by knurled knob for consecutive numbering.

**NUMBERALL STAMP
& TOOL CO.**

Huguenot Park,
Staten Island, N. Y.

CUT COSTS-SAVE TIME TRY THESE SENSATIONAL **KIPP^{air}GRINDERS**



**THE PROOF—
10 DAY FREE TRIAL**



This FREE trial offer permits any concern with a satisfactory credit rating to try out any Kipp Air Tool for ten days. Grinders sell from \$9.75 to \$58.75, Chippers and Filers at \$19.75. The BB Grinder shown at top is only \$25; the AG Grinder, lower view, is \$19.75. Kipp Air Tools give you highest speeds, lowest prices and are proving indispensable in tool rooms and production departments. New catalog gives details.

**FREE!
TEN-DAY
TRIAL**



**FREE!
AIR TOOL
CATALOG**

☐ Send Kipp Air Grinder Model ____ on your 10 day Free Trial Offer!

☐ Send the New Kipp Air Tool Catalog!

Name _____

Company _____

Address _____

MADISON-KIPP CORPORATION

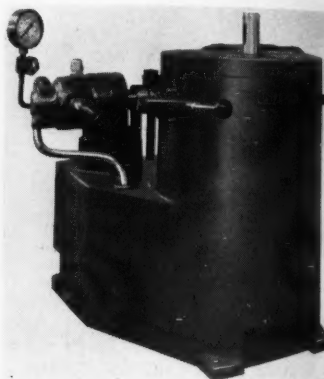
208 WAUBESA ST., MADISON, WIS., U. S. A.

Head is furnished with a heavy over-arm clamp graduated to 360 deg. The clamp is bored to fit any mill and is fitted with a spreading screw for easy mounting. The Halco Milling Head is supplied complete with $\frac{1}{2}$ h. p., 110 volt, 60 cycle, ball bearing motor with plug-in cord and switch. The motor is easily reversible for left-hand cutters and is available in speeds of 500 to 2,900 r. p. m. or 350 to 2,400 r. p. m. The ball crank handle for vertical travel is drop forged and is equipped with a dial graduated to 1/1000 in. Net

weight of head, 90 lb.; shipping weight 115 pounds.

Greenerd No. H 70 P 30-Ton Pull Type Hydraulic Press

To the line of hydraulic presses made by Greenerd Arbor Press Company, Nashua, N. H., has been added the



Greenerd No. H 70 P 30-Ton Pull Type Hydraulic Press

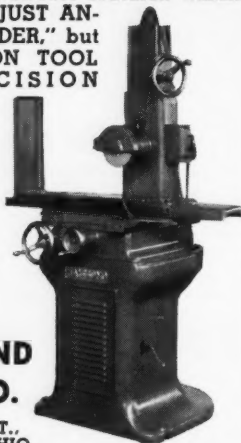
H 70 P 30-ton special pull type press shown in the illustration. The maximum pressure is 30 tons. The table, which is 34 in. from the floor, is 24-in. diameter and the 2 $\frac{1}{2}$ -in. diameter ram is of hardened and ground high alloy steel with a slot in the end to receive drift pin. The height of the ram above the table is: minimum, 5 $\frac{1}{2}$ in.; maximum, 22 $\frac{1}{2}$ inches.

The ram is controlled by means

PRECISION GRINDING

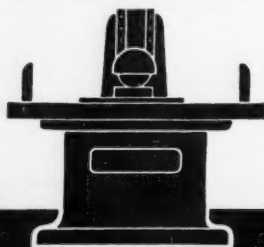
With THE HAMMOND 6"x18" HAND FEED SURFACE GRINDER. This machine incorporates a number of exclusive and desirable features which make it not "JUST ANOTHER GRINDER," but "A PRECISION TOOL FOR PRECISION WORK."

Circular and
Complete
Information
Upon
Request.



THE HAMMOND MFG. CO.

3091 E. 80TH ST.,
CLEVELAND, OHIO



ABRASIVE Surface Grinders

QUALITY • ACCURACY • DURABILITY • ECONOMY

WRITE FOR PARTICULARS

ABRASIVE MACHINE TOOL CO.

EAST PROVIDENCE, R. I.

KELLY SHAPERS SIGNIFY



Since 1895

PROFITABLE INVESTMENT

BUILT BY

General Engineering & Mfg. Co.
ST. LOUIS MISSOURI

To "Speed Up" NATIONAL DEFENSE SAVAGE NIBBLING MACHINE

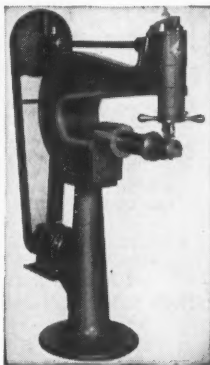
for TUBE SLOTTING & TUBE SHAPING

Special Tube Cutting Nibbler. Fast and accurate tube slotting, trimming and shaping by guide template or to a scribed line.

In addition to tube cutting, this special nibbler will cut flat sheets. Standard equipment includes a circle cutting attachment and material support plate.

Capacity—Tubes
4" OD. to 36" OD.

Wall Thickness
to 1/8".



Tube Cutting Nibbler.

Manufactured by

W. J. SAVAGE COMPANY

KNOXVILLE Since 1885 TENNESSEE
Pioneer Manufacturers of Nibbling Machines

QUICK DELIVERY! LOW COST!

The new Simmons Lathes feature the Micro-Speed Drive, an important fast-production asset. This Drive, contained in the cabinet leg, permits instant selection of an infinite variety of spindle speeds by the mere turn of a handwheel.

Timken Precision Spindle Bearings.

Snap levers for apron feeds.

Added Efficiency Under Heavy Loads.

Simmons Lathes are manufactured in 16", 18" and 20" standard. 18"/25", 18"/27", 22"/34", 22"/40", 26"/40" and 28"/50" bed lengths.



The 16" and 18"
Standard Lathe.

COMPLETE SPECIFICATIONS UPON REQUEST.
WRITE TODAY.

SIMMONS MACHINE TOOL CORP.

1745 Broadway, Albany, N. Y.

Singer Bldg., New York City

MODERN MACHINE SHOP 201

The M-B "Utility" Pneumatic Grinder. Model U.-T. R.

A 60,000 R.P.M. Unit



Steel Housing (For Safety)

A WORTHY COMPANION TO OUR
FAMOUS "SUPER SPEED" MODEL
S. S.—S. R.

SPECIAL GREASE SEALED BEARINGS
NO LUBRICATION REQUIRED.
AN ABUNDANCE OF POWER.

OTHER MODELS, ALSO AIR LINE FILTERS
AND AUTOMATIC AIR LINE
LUBRICATORS.

Write for details and data on Free Trial Offer.

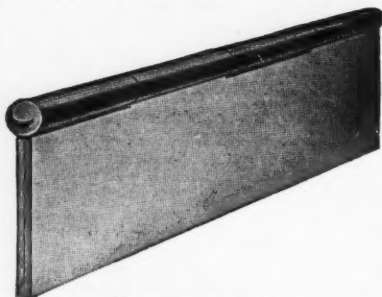
M-B PRODUCTS

130 E. LARNED ST. DETROIT, MICH.

Export Office: 44 Whitehall St.
New York, N. Y., U. S. A.

AUTOM

CONTINUOUS HINGES



Manufactured by
**AUTO MOULDING
& MFG. CO.**

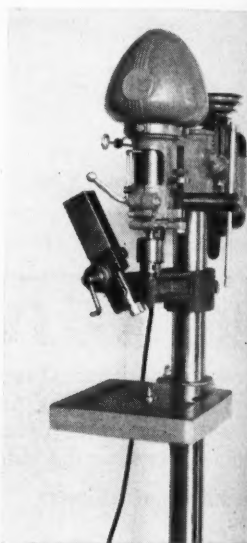
2326 S. CANAL ST. CHICAGO

WRITE FOR STOCK LIST

two handles either of which stops the press upon being released. The speed of the ram in rapid traverse is 138 per minute and the working speed 15 to 30 tons pressure is 38 in. per minute. The press is operated by a h. p., 1200 r. p. m. motor and starts for 220-440-550 volt, 2 or 3 phase, 60 cycle current as standard equipment.

Dalzen Combination Center Grinder and Drill Press

Dalzen Tool & Mfg. Co., 511 Leith St., Detroit, Mich., is now offering a combination center grinder and drill press.



Dalzen Combination Center Grinder and Drill Press

which features an unusually rapid easy change-over, either from center grinder to drill press or from drill press to center grinder. According to manufacturer, the center grinder has been successfully employed in all during the past several months.

To change the machine into a press, the operator simply loosens a bolt, raises the dresser up to its height, and swings it out of the way.

The Dalzen Combination Center Grinder and Drill Press can be

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The sp
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38 in.
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and star
phase, 50
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Press

511 Leib
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J & H

The Demagnetizer

For Alternating Current

The J & H Demagnetizer requires no countershaft, belts, or other intricate electrical connections. All that is necessary is to plug it into the nearest lamp socket or receptacle.

It is of the new Unipole type—heavy duty—and can be supplied for either 110 or 220 volt alternating current. Size 12" long, 9" deep, 6" high. Weight 60 lbs.

Sold On One Week's Trial

J. & H. ELECTRIC CO.

12 Richmond Street, Providence, R. I.

BURKE Milling Machines



No. 4
Motor
Driven
Milling
Machine

Mounted
on
Cabinet
Column

Burke motor driven milling machines Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

BURKE MACHINE TOOL CO.

297 E. 16th St.

Conneaut, Ohio

from cylinder through by-pass in
under head enters this slot on its
to the outlet above. No opening in
the inner surface of cylinder means
in operation.

OUTLET
threaded for
iron pipe.

Steel stud in piston holds
it close to cylinder at top,
preventing loss of air pressure
there.

Sealing in at inlet
valve comes through
piston into
under head by-
pass and thence
to the cylinder.

Opening in curved
inner surface of
cylinder
to outlet
valve.

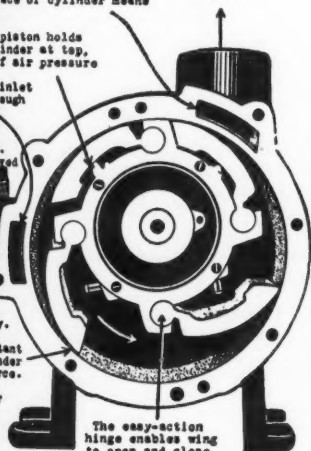
Standard
pipe.

Composition
to require
oil frequently.

Kept in constant
contact with cylinder
centrifugal force.

ing and cylinder
valve become
and glassy-
ing, insuring
perfect fit
positive pressure
there.

air space resulting
small piston and
valve stops.



The easy-action
hinge enables wing
to open and close,
thus becoming wear-
compensating by the action
of centrifugal force.

LEIMAN BROS. PATENTED HIGH PRESSURE BLOWERS

AND

VACUUM PUMPS

GAS BOOSTERS

AIR MOTORS

For Gas Furnaces -- Blow
Pipes -- Oil Burners --
Gas Machines -- Atomizing --
Agitating -- Vacuum Printing
Frames -- Paper Feeding --
Bottle Filling -- All Automatic
Devices.

SENT ON TRIAL!

They Take Up Their Own Wear

LEIMAN BROS. 169-3K Christie St.
NEWARK, N. J.

Makers of Good Machinery For Fifty Years

r Grinder and

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from com
from drill
according
r grinder
yed in the
months.
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up to its
of the
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s can be

December, 1940

MODERN MACHINE SHOP 203

nished in any desired length and is supplied complete with 110-220 volt motor, diamond, and grinding wheel. It has four speeds, V-belt drive, and is designed to handle a wide range of work.

Greenerd No. H 70 30-Ton Hydraulic Press

Greenerd Arbor Press Company, Nashua, N. H., has brought out the No. H 70 30-ton hydraulic press illus-



SMALL THINGS TO DO THAT WILL HELP YOU AVOID HEADACHES ...

ORDER THAT NEXT LOT OF JIG BUSHINGS FROM ACME

Because:

You can choose from a complete stock of both A. S. A. and Acme Standards.

They are easy to select from our catalog.

You can order by 'phone.

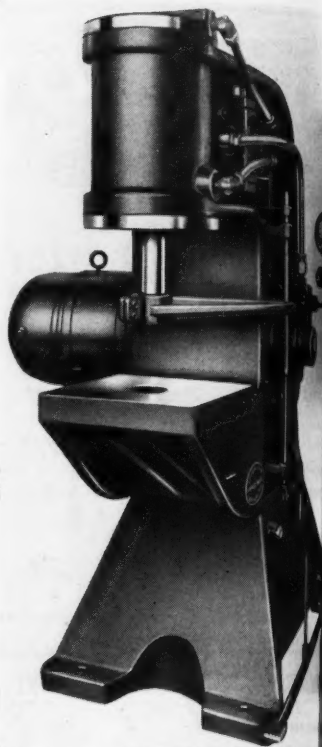
They arrive promptly and thus avoid delays in your shop.



ACME INDUSTRIAL COMPANY

MONroe 4122

212 N. Laflin St., Chicago, Ill.



Greenerd No. H 70 30-Ton Hydraulic Press

trated herewith. The press is self-contained, with pressure variable from 10 to 30 tons on the down stroke.

The frame and cylinder are of hydraulic semi-steel and the cylinder honed to size within close limits.



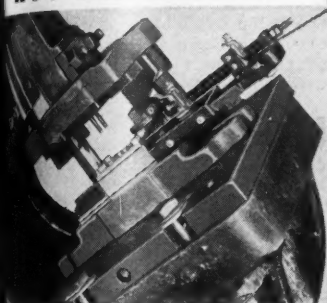
THERE'S A HILLIARD CLUTCH FOR EVERY JOB . . . Over-Running—Friction—Single Revolution—Slip-Specific THE HILLIARD SINGLE REVOLUTION CLUTCH

An automatic clutch for intermittent and positive drive. Especially valuable for cutting or punching operations, packaging machines, etc. Simple trip makes it suitable for mechanical, electrical, manual control. Write for booklet giving full information.

THE HILLIARD CORPORATION • 117 W. 4th St., Elmira, N. Y.
Chicago Office, 201 North Wells St.

HILLIARD CLUTCHES • ELMIRA, N. Y.

DICKERMAN HITCH FEED

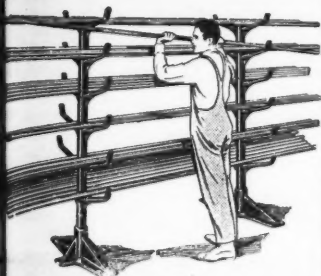


Adaptable to any ordinary punch press without press alterations. Feeds from any position on any style die. Quick set-ups economical for short runs.

Write for folder No. 84.

DICKERMAN MFG. CO.
Albany St. Springfield, Mass.

DOWN SECTIONAL RACKS



Systematic storage of Bar Stock, Pipe, etc. Can be built to various heights or extended by adding units. With all sizes plain sight, stock can be selected instantly or orders for new stock determined without waste of time.

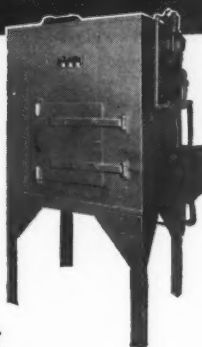
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DOWN ENGINEERING CO.
N. 3rd ST. READING, PA.

HANDY FURNACE

Every Shop Needs

for
- DIES -
- TOOLS -
PRE-HEATING
ALUMINUM
FORGINGS



275° to 1250° F.

DESPATCH *Utility* FURNACE

A furnace that matches its name. In the tool room or in production this furnace does the job accurately and fast. No lost time waiting for temperature changes or checking temperatures. The Despatch furnace will maintain any point from 275° to 1250° F. — no overshoot or creeping.

**ECONOMY • CONVENIENCE • FLEXIBILITY
UNIFORMITY**



Bulletin No. 83 will give interesting details of how Despatch furnace can combine many features to make an all around utility furnace satisfactory.

WRITE FOR **83**
BULLETIN

**DESPATCH
OVEN COMPANY**
MINNEAPOLIS MINNESOTA

MODERN MACHINE SHOP 205

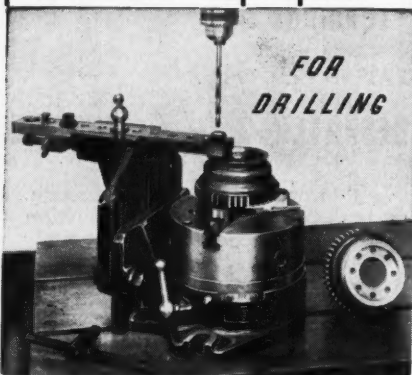
motor and pump, direct-coupled, are mounted on opposite sides of the main housing. The piston, which is 9-in. diameter, has 6 cast iron rings and the ram gland is packed with chevron-type packings. The ram is of heat treated alloy steel, hardened and ground, 2 $\frac{1}{4}$ -in. diameter with a 1-in. hole 2 in. deep. It is equipped with a hardened shoulder plug.

The working table, which is approximately 34 $\frac{1}{2}$ in. from the floor, is 18 in. wide by 15 in. deep and has a 3 $\frac{1}{2}$ -in. cored hole centrally located with the ram.

Rapid traverse is provided for ram up to 15 tons pressure at a rate of 138 in. per minute, with instantaneous changeover to a working speed of 38 in. per minute within a range of 10 to 30 tons pressure. The height of the table is 14 in. and work up to 24 in. diameter can be handled. The angle of the ram is adjustable from 1 to 15 degrees.

The press is equipped with a 10 h.p. 1200 r. p. m. motor and starter for 440-550 volt, 2 or 3 phase, 50 or 60 cycle current as standard equipment. Speeds are figured at 60 cycles.

HARTFORD "Superspacer"



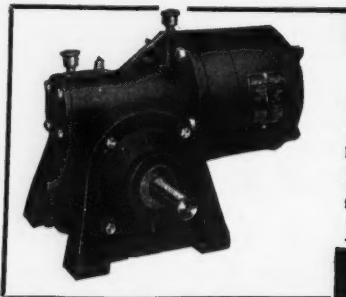
Swings work 11" dia. Holes up to $\frac{3}{4}$ " dia. can be drilled using standard A.S.A. removable bushings. Stop is used when bushing bar must be shifted. Write for folder.

HARTFORD SPECIAL MACHINERY CO.
HARTFORD • CONN.

Hardinge High Speed Precision Second Operation Machine

Recognizing the need of efficient equipment for second operation work, Hardinge Brothers, Inc., Elmira, N. Y., has developed a machine designed to produce second operation work at high speeds. Features of the machine are: (1) enclosed head with preloaded bearing spindle construction, (2) electrical driving unit with multi-speed motor eliminating all gears, clutches, loose pulleys, (3) convenient lever control at the headstock, and welded, all-steel pedestal.

The bed of the machine is amply proportioned and rests on three spindles for perfect three-point suspension. The headstock design includes preloaded ball bearing spindle construction, bearings being fully enclosed in an inner chamber and effectively sealed against the entrance of foreign matter. The rear of the spindle carries a double V-pulley for two endless V-belts to the driving unit, and the belts may be applied or removed without removing the headstock spindle or bearings.



Janette Speed Reducers

FOR SLOW SPEED DRIVES

43 Sizes 1/50 to 10 H.P.—.08 to 1140 r.p.m.

Reliable operation is an outstanding feature of Janette speed reducers. Thousands of these units are driving vitally important voltage regulators and combustion control equipment in large power plants; continuously operated processing machinery in machine tools in important plants building equipment for National defense, etc. Why not use reliable Janette reducers for driving your slow speed machines.

● Ask For Your Copy of Our 100-Page Bulletin
Also Converters, Blower Wheels, Motor Generators

Janette Manufacturing Company

555-558 West Monroe Street Chicago, Ill. U.S.A.



COLLECT ON STAMPS

You COLLECT when you use THOR STAMPS—because their correctly-heated alloy steel assures more marks per dollar. Central striking point gives uniform indentation. Thumb side-marking makes them easily read—easily used.

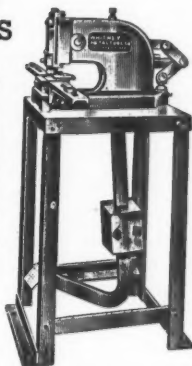
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Pittsburgh Stamp Co., Inc.
CANAL ST. • PITTSBURGH, PA.

WHITNEY-JENSEN TOOLS

No. 28 and 29 FOOT PRESSES

For fast, semi-production punching operations. Capacity 2" hole in 16 gauge. Can punch 100 pieces per minute. Sturdy and powerful. Works with an easy push of one foot.



Write for
New No. 14
Catalog.

No. 28—7" THROAT DEPTH
No. 29—10" THROAT DEPTH

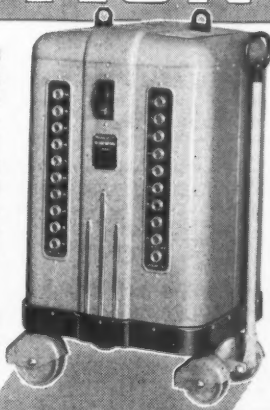
Whitney Metal Tool Co.

110 FORBES ST. ROCKFORD, ILL.

Step Up PRODUCTION

MARQUETTE A.C. ARC WELDER

Not only is A. C. Arc welding the best and cheapest method of fabricating and repairing most metal parts but most parts



can be welded without removing or preheating thus eliminating shut downs and speeding up production. Because an operator can do more jobs with an arc welder production is stepped up without the addition of extra man power.

Marquette is the leader in the A. C. welding field... there is a Marquette for every purpose, eight models ranging from 125 to 350 amps., and a Marquette in your price range, \$98 to \$448. See your local jobber or write direct to:

MARQUETTE MANUFACTURING CO., INC. MINNEAPOLIS, MINN.

An automatic collet closer permits rapid opening and closing of the collets or step chucks while the spindle is stationary or operating. The collet or step chuck is easily opened by movement of a conveniently located lever.



Hardinge High Speed Precision Second Operation Machine

The double tool cross slide is of rugged design and the tool blocks, as well as the tool bit holders, are adjustable. Positive stops assure accurate cross slide forming. Standard circular form tool holders may be applied in place of the tool blocks.

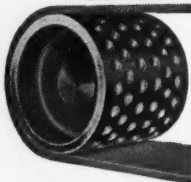
Maximum rigidity and clearance for

tools is assured through the use of tilted hexagon turret. The turret is automatically indexed and the independent turret stops are indexed the same time, affording rapid and accurate operation. The six-position turret

head is automatically indexed and locked into position moving the operating lever to the extreme right at the same time the six independent stops are indexed, affording rapid accurate operation of the turret. All spindle speeds are controlled by two levers at headstock end of the machine. Eight forward and eight reverse speeds are available from 28 to 3,900 r.p.m. A built-in coolant system operating in the pedestal provides an adequate supply of coolant for high production.

The motor and driving unit are completely enclosed in pedestal, assuring protection of the unit and safety to the operator. The motor is completely insulated from the pedestal by rubber cushions, protecting machine spindle from vibration. A large door in the front of pedestal facilitates changing belt from one step of the main pulley to another. Storage shelves with two shelves for tools attachments can be reached through a door on the right side of the pedestal. The machine is equipped with a belt for quick stopping of the spindle to increase production. An important feature is that adjustment may readily be made from the front of the machine without removing any part of the machine driving unit. The machine has a capacity of 1 in. with 6-in. step chuck capacity and 9-in. swing.

NO BELT SLIPS WITH VACUUM CUP C. I. PULLEYS



Pat'd U. S.
Canada
Great Britain

**30 Day Free
Trial Offer.**

Stock most Std. Sizes to 16" Dia.
Supply sizes 2" to 72" Dia.

**Shut Off Expense Caused by Slippage
You Save Money on Every Installation**

**NEW LOW PRICED PRODUCTION LINE
SEE PART LIST Prices Below**

Dia.	Face	Price	Dia.	Face	Price
2"	x2 3/4"	\$1.25	4"	x3 3/4"	\$2.85
2 1/2"	x2 3/4"	1.45	4 1/2"	x5 1/2"	3.95
3"	x3 3/4"	2.25	5"	x4 1/2"	4.25
3 1/2"	x3 3/4"	2.55	6"	x5"	4.75

We Supply Fractional Dia. and Face Pulleys—From Casting Stock.

VACUUM CUP METAL PULLEY CO.,
12536 Grand River Ave.,
Detroit, Mich.

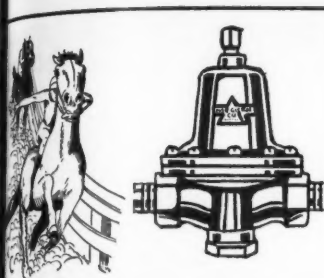
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Norgren Regulators, like skilled jockeys, hold air power under perfect control. The diaphragm, made of phosphor-bronze, is protected by a resilient member that assures quick, tireless bounce-back—an exclusive Norgren feature. Norgren's last longer—least less to operate. Available in sizes 1/8" to 1" for reduction of pressures as great as 400 lbs. to pressures of 5 to 10 lbs. Write for circular and prices.

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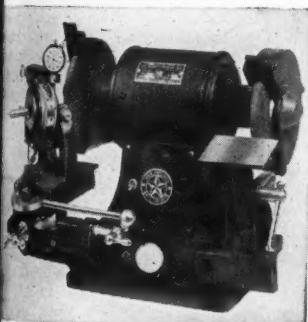
A. NORGREN CO., INC.
SANTA FE DRIVE
DENVER, COLO.



Norgren Regulators, like skilled jockeys, hold air power under perfect control. The diaphragm, made of phosphor-bronze, is protected by a resilient member that assures quick, tireless bounce-back—an exclusive Norgren feature. Norgren's last longer—least less to operate. Available in sizes 1/8" to 1" for reduction of pressures as great as 400 lbs. to pressures of 5 to 10 lbs. Write for circular and prices.

A. NORGREN CO., INC.
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DENVER, COLO.

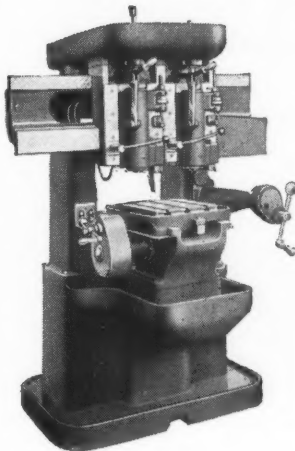
Trim Your Drill Costs with a STAR PRECISION DRILL GRINDER



perfect points on drills No. 41 to 5/8" inc. Write for Descriptive Folder.

Star Machine & Engineering Corp.
Star Electric Motor Co., Bloomfield, N. J.

LOW COST MILLING OF SMALL PARTS



Small interchangeable parts are produced accurately and at low cost on this MOREY No. 12M High Speed Vertical Profiler and Milling Machine.

Cross rail design with slide castings carrying spindles and motors assures vibrationless performance. Table may be dropped to increase distance from spindle to table (maximum, 12").

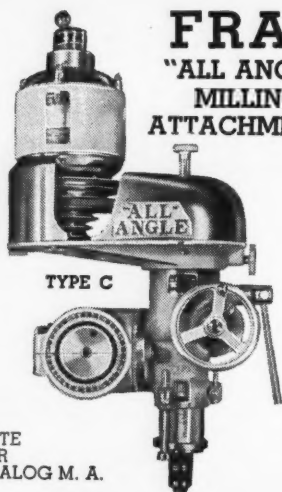
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MOREY MACHINERY CO., Inc.
410 BROOME ST. • NEW YORK, N. Y.

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Increase
your
Production
—From
CO.,
Detroit, M

December, 1940



FRAY "ALL ANGLE" MILLING ATTACHMENTS

TYPE C

WRITE
FOR
CATALOG M. A.

FRAY MACHINE TOOL CO.
GLENDALE, CALIF.

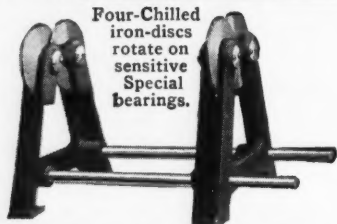
Improved Anderson Balancing Ways

*No Leveling
Required*

A simple and
excellent de-
vice for bal-
ancing,
straightening
and truing.

They are made in
the following sizes:

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



Four-Chilled
iron-discs
rotate on
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Special
bearings.

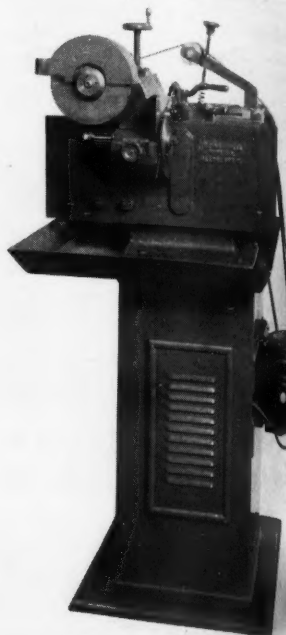
Write for Full Information

Made
by **Anderson Bros. Mfg. Co.**
1926 Kishwaukee St. Rockford, Ill.

Wardwell No. 57T Automatic Circular Saw Grinder

The Wardwell Manufacturing Co., 3166 Fulton Rd., Cleveland, Ohio, brought out a grinder designed for automatic sharpening of form milling cutters and metal cutting saws in gang from 2 to 8-in. diameter and up to 1 in. thickness, with spacing of teeth to 1 1/4 in. from point to point.

The machine will automatically in-



Wardwell No. 57T Automatic Circular
Grinder

the gang of saws, one row of teeth at a time, with the grinding wheel shaped to suit the gullet of the tooth. It is stated that with this saw it is possible to sharpen a gang of saws without variation of plus or minus 0.001 in. exact diameter of the entire lot. A group of 250 saws each 0.015 in. can be sharpened at one time.

The frame of the machine is a piece casting of very rigid design. All bearings are either the ball

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December, 1940

CAUSE KENNA METAL STRONGER

Tools tipped

with this su-

per carbide show greater re-
sistance to breakage:

When used for interrupted cutting, such as in
grinding or planing operations.

When used for heavy, rough cuts at increased

speeds, grinding with chip breakers for curling
of chips.

In addition, the greater strength of KENNA-
METAL permits tools to be designed with more
aggressive rake and clearance angles.

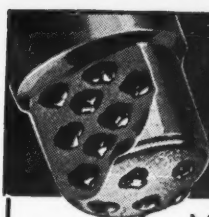
KENNA METAL costs no more than ordinary car-
bide materials — write for our new Price
List No. 5.

Style No. 11 Tool

McKENNA METALS Co.

300 LLOYD AVENUE

LATROBE, PENNSYLVANIA, U.S.A.



**Free Cutting!
Non-Glazing!
Abuse Proof!**

New WTTCo Diamond Impregnated WHEEL DRESSER

Whole, unbroken diamonds of high quality
and extreme toughness are spaced regu-
larly throughout the matrix to give great
accuracy, uniform dressings and to hold
wheel to size. These stones are anchored
permanently in their matrix by strong
chemical bonds that will not break under
heat, pressure or rough abuse. No re-
mounting! Lowered production costs!

Send for literature and prices.

WHEEL TRUEING TOOL CO., INC.

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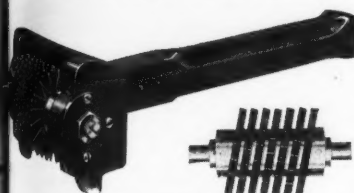
Detroit

In Canada: 575 Langlois, Windsor, Ont.

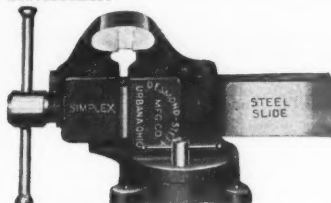
GRINDING WHEEL DRESSERS--VISES

We manufacture the only complete line of
Grinding Wheel Dressers and cutters and will
readily suggest the proper one for your wheels.

The exclusive solid steel slide makes
Simplex Vises stronger and more
serviceable.



Desmond Heavy-Duty Dresser



Simplex Machinists' Vise



Desmond Diamo-Carbo Dresser, best tool room dresser.

Write for catalog M showing complete line of Desmond Dressers
and Simplex Vises and name of your nearest dealer.

DESMOND-STEPHAN MFG. CO., URBANA, OHIO

Canadian Desmond-Stephan Mfg. Co., Ltd.—Hamilton, Ont.

bronze type. The worm and gears run in heavy oil. The grinding wheelhead is equipped with a long and unusually large grinding wheel spindle mounted on grease-sealed ball bearings at one end and two Timken bearings which are adjustable and completely protected against dust and grit at the other end.

The grinding wheelhead is fitted to the frame in dovetail slides and is gibbed for adjustment. The design is such that the wheel is fed into the work. The saw arbor is fitted to a hole in an adjustable cross slide which is fitted to dovetail ways on a knee of

the horizontal slide. The horizontal slide reciprocates under the grinding wheel or dovetail slides and is gibbed to take up wear. The cross slide can be adjusted to obtain any hook design on the tooth.

The eccentric by which the reciprocating slide is operated is adjustable for a stroke up to 5 in. The eccentric shaft is provided with a clutch which can instantly be thrown in or out of connection, stopping the movement of the slide. The slide travels at a speed of 20 strokes per minute and the speed can be increased through a variable speed V-pulley on the motor. The saws are automatically fed through an independent plate at the opposite end of the saw arbor. The feeding is entirely independent of the saw and no attention is required after the machine is once started.

A diamond dresser is available for mounting to the wheel guard. The dresser has horizontal adjustment and the wheel and swings in line with the center of the spindle. It is adjustable for any angle desired. The machine can be furnished for either belt or motor drive and with or without the pedestal. Coolant pump is furnished with the pedestal type only.

**CIRCLE
"R"**



**Trade
Mark**

Standard or Special Drills

CIRCLE "R" combination center drills are cost-cutting production tools. Special alloy and high speed steel. Write for catalog.

CIRCULAR TOOL CO., Inc.

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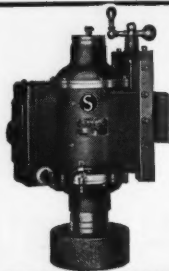
INDIANAPOLIS
NEW YORK
SYRACUSE

PROVIDENCE R. I.
PHILADELPHIA
PITTSBURGH
ST. LOUIS

No. 1-F Fastermatic

The illustration shows the No. 1-F Fastermatic machine which has been brought out by Foster Machine Company, Elkhart, Ind. The No. 1-F is of construction similar to the No. 2-F Fastermatic made by this same company.

The No. 1-F Fastermatic has a regular range of 27 spindle speeds from 1 to 332 r. p. m., arranged in nine sets of three automatic changes. Any group



GRINDERS for PLANERS

VERTICAL SPINDLE GRINDERS for PLANER OR BORING MILL

1/2 H.P. to 10 H.P. 3,600, 1,800 or 1,200 R.P.M. With Vertical or Horizontal Feed, both Feeds, or without Feed, Mounting Pad to suit.

WRITE FOR BULLETIN 17A

MANUFACTURERS OF:

Portable Electric Drills, Grinders, Blowers, Grinders, Tool Post, Snagging, Disc, Ring Wheel, etc., Buffing and Polishing Machines, 1/2 H.P. to 25 H.P.

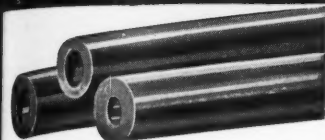
THE STANDARD ELECTRICAL TOOL CO.



8TH & EVANS STS.
CINCINNATI, OHIO



**SAVE MONEY
on BISCO
TOOL STEEL TUBING**

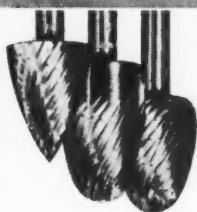


You Save the cost of drilling rings, washings, etc., when you order **BISCO** Tool Steel Tubing. The holes are **FREE**. Sizes up to 14" diameter.

**TOOL STEELS • ALLOY STEELS
STAINLESS SHEETS AND BARS**

The Bissett Steel Co.

13 EAST 67th ST., CLEVELAND, OHIO

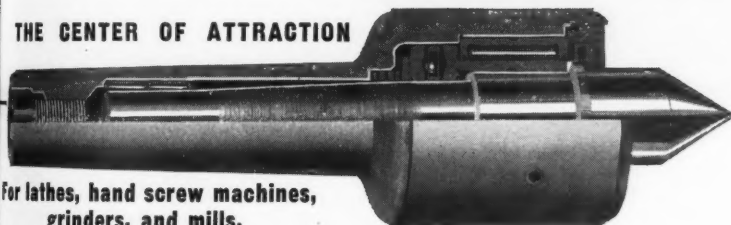


**CUTS
CLEAN
SHARP
CHIPS**

Because **Severance Midget** Milling Cutters are hardened and drawn to 63-65 Rockwell — and then ground from the solid — they cut clean, sharp chips. **Severance Midget** cutters, tube burring cutters and chatterless countersinks reduce finishing time up to 75% on scores of metal, rubber or plastic products. Send us your problem or write for Catalog.

Severance Tool Manufacturing Co.
1516 East Genesee Ave. • Saginaw, Mich.

THE CENTER OF ATTRACTION



For lathes, hand screw machines, grinders, and mills.

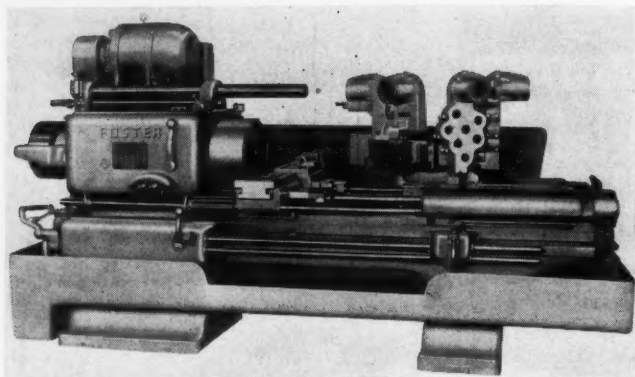
Economical Live Ball and Roller Bearing Centers are going to play an important part in our defense program.

Features that interest you most:

1. Simplicity, sturdiness, and heavy duty.
2. 50% more radial load carrying capacity than the average live center.
3. Large spindle, small head, short overhang most desirable for rigidity and to be free from chatter.
4. With aid of cap screw you can lock spindle to redress point right in your machine.
5. Special oil seal to retain lubricant and keep out foreign matter.
6. A compression pad to compensate for heating and expansion of metal as a safety factor, with reasonable diligence exercised.

A folder giving prices and complete details will be mailed to you upon request. A ten-day trial. If not perfectly satisfied, your money will be cheerfully refunded.

MOTOR TOOL MFG. CO. 12282 TURNER AVE. DETROIT, MICHIGAN



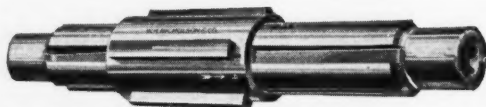
No. 1-F Fastermatic

these automatic changes may be obtained through the proper set of pick-off gears and higher ranges may be had when required. A positive flow of power is supplied to the spindle during the spindle speed changes, resulting in a smooth, uniform finish on the work and eliminating tool breakage. The helical gear train, shafts, spindle, and entire transmission mechanism run in a bath of oil. The spindle is equipped

with a quick-acting brake for quick stopping.

Spindle speed changes are selected through a selector on the front of the machine which governs the operation of hydraulically-operated compensating multiple disc clutches. Spindle speeds may be changed with as many faces of the turret as required. The headstock is powerful, smooth, and quiet. The main shaft is supported in the center, eliminating the possibility of whip torque to the shaft under heavy load. High spindle speeds, or intermittent cuts.

The hydraulic feeds are powerful, flexible, and readily adjusted. A separate, independent feed is provided for



NICHOLSON EXPANDING MANDRELS—for holding any job with bores from $\frac{1}{2}$ " to 7" while being machined on lathes, grinders, or millers. Fourteen sizes—great time savers.

OTHER PRODUCTS: Steam Traps, Chromium Plated Steel and Stainless Steel Floats, Compressed Air Traps, Flexible Couplings, Steam and Air Separators, Arbor Presses.

CONTROL VALVES, flat disc type—for operating single and double acting air, steam, water or oil cylinders. $\frac{1}{4}$ " to $1\frac{1}{2}$ " sizes.



W. H. NICHOLSON & CO.
136 Oregon St. Wilkes-Barre, Pa.



Style A

Flange Boring

BOKUM Long Life Boring, Bottoming and Internal Threading Tools

... for holes from $\frac{3}{32}$ " up. Three types... twelve sizes. Real money savers for lathe, jig borer, screw machine or boring mill.

Write for bulletin and price list.

BOKUM TOOL CO., INC.

49 W. Hancock St. Detroit, Mich.

Licensed manufacturers of all types and designs of Carbide Tipped Tools



Style B

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CYLINDRICAL SUB-PRESSES



ARCH TYPE

Humboldt Machine Works

Massachusetts

Specialties



14
to
96
D.P.



ON THE SMALL RANGE—Spurs, Spirals,
Worm Gearing, Racks, Ratchets, etc.
High precision or commercial production.
In stock ONLY—No Stock—No Catalog.

Specialties

Modell Ave. Phone - Humboldt 3482

CHICAGO

December, 1940



Woody Spencer Says:
NATIONAL DEFENSE
ORDERS CALL FOR
ACCURACY ... SO,
SPECIFY
**WOOD & SPENCER
TAPS!**




- Complete line of taps meet strictest requirements for accuracy and precision.
- Quick delivery is assured on either standard or special taps.
- Catalog No. 5 simplifies tap ordering — Write for it.

*"The Right Tap
at the
Right Time"*

**THE
WOOD & SPENCER
COMPANY**

CLEVELAND • OHIO



BAUMBACH

**STANDARDIZED
DIE SETS**

Machined Steel Semi-Steel

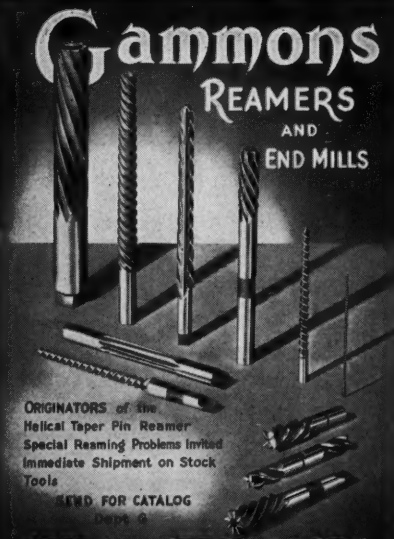
DROP FORGED STEEL

Standardized Die Sets, embodying many exclusive features, a listing of more than 195,000 stock sizes and 46 different styles afford a service that is unsurpassed.

Send for Our New 336 Page Catalog

E. A. BAUMBACH MFG. CO.

1806 S. Kilbourne Ave. Chicago, Ill.



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REAMERS

AND

END MILLS

ORIGINATORS of the
Helical Taper Pin Reamer
Special Reaming Problems Invited
Immediate Shipment on Stock
Tools

SEND FOR CATALOG
Dept. 2

SPIRAL SPECIALISTS

THE GAMMONS-HOLMAN CO. MANCHESTER, CONN.

each turret station. The hexagon ret may be indexing or non-indexing required and the front and rear slides are independent of each other.

The swing over the bed is 21 in. the total distance from the spindle to the turret face is 41 1/4 in. 7" space required, 40% x 122 in. Weighs approximately 7,000 pounds.

Wittman Spacing Machine

The time-consuming task of spacing holes and laying out expensive parts, special parts, and pieces on a run production jobs can be considered



Wittman Spacing Machine

shortened by the use of a spacing machine which has been brought out by G. F. Wittman Company, 20 N. Wood Ave., Dayton, Ohio. The machine is hand operated, assuring freedom of operation while dealing with rotary blows. The most pronounced advantage of this tool consists in the quick changeover for short run production lots by which the cost of preparing limited production lots is reduced to the minimum.

The machine is available in three styles; the spacer and the follow-up press. The follow-up press is of

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PRODUSA
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December, 1940



TOLEDO Variable Speed Transmissions

For variable speed control of V Belt driven equipment.

Low in Cost... Easy to Install... Convenient Size... Simple to Operate... No Belts to Shift... Infinite Speed Selection in Stepless Speed changes.

Types 1A and 2A Provide up to 3 to 1 Ratio Power Ratings from Fractional to 4 H.P.

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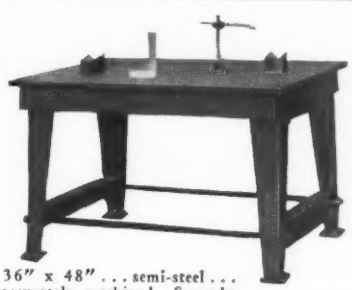
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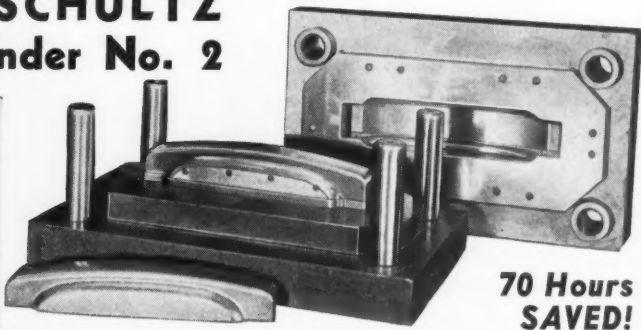
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**70 Hours
SAVED!**

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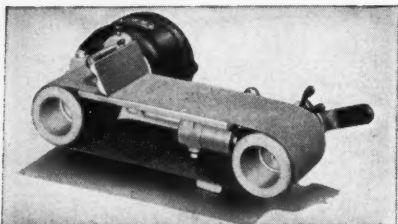
BOYAR-SCHULTZ CORPORATION
WALNUT STREET CHICAGO, ILLINOIS

MODERN MACHINE SHOP 217

same design as the spacing machine excepting that the spacing plate is removed and a stripper of different type is used. Spacing is very simple, requiring only three special micrometers and end measuring rods of determined length. By selecting the proper grooves for the initial placement of the micrometers and rods, the work can be moved with respect to a fixed point in order to determine any other point from the fixed point. Punches and dies are inexpensive, of the rapid interchangeable type, taking less than a

minute to change from one size to other up to $\frac{5}{8}$ -in. diameter when the standard micrometer - control spacing plate. The machine can easily be converted for regular punching, riveting, marking or staking. Perfect alignment of the punch and die is assured at all times.

The punching capacity is 15,000. Depth of throat, 8 in. Area of spacing plate, 12 x 16 in. Height from base center of 20-in. handwheel, 18 $\frac{3}{4}$ in. Stroke, $\frac{1}{2}$ in. Adjustment of punch arm, $\frac{3}{4}$ in. Adjustment for die, $\frac{1}{4}$ in. Bench space required, 14 x 18 in. Shipping weight, 370 pounds.



NEW An Inexpensive ABRASIVE BAND GRINDER..

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The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on the belt. Ball bearing throughout. Equipped with ALEMITE LUBRICATION complete with grease gun.

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Barber-Colman Type T Hobbing Machine

The Type T hobbing machine built by Barber-Colman Company, 207 Locust St., Rockford, Ill., is now available with several new attachments and a number of new improvements which contribute considerably to a wide range of usefulness. Although the machine was originally designed for hobbing taper splines on shafts, it has application for standard hobbing and the new improvements and attachments make possible the economical of this machine in shops which have a variety of hobbing work to be done.

The main point of difference between the Type T and the regular Type T hobbing machine lies in the hob construction of the Type T machine which provides a means to traverse the hob both longitudinally and laterally at the same time. The result is that the hob is fed in at an oblique angle to the work, which is necessary in the hobbing of a taper spline on the

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- No. 1 Capacity 0 thru 3/32" wire, \$1.25
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Will Earn Its Cost In One Day
The HJORTH Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one at your shop. You'll like it and the price is reasonable.

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GOOD LEAD RUBBER

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is a clumsy tool
will split and crack.
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edges that turn,
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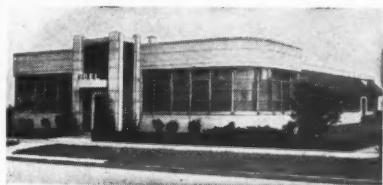
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for watch making components and small work up to passage of 1/2" bar eventually up
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Complete working drawings of machines, jigs, fixtures, special tools, assembly instructions and all
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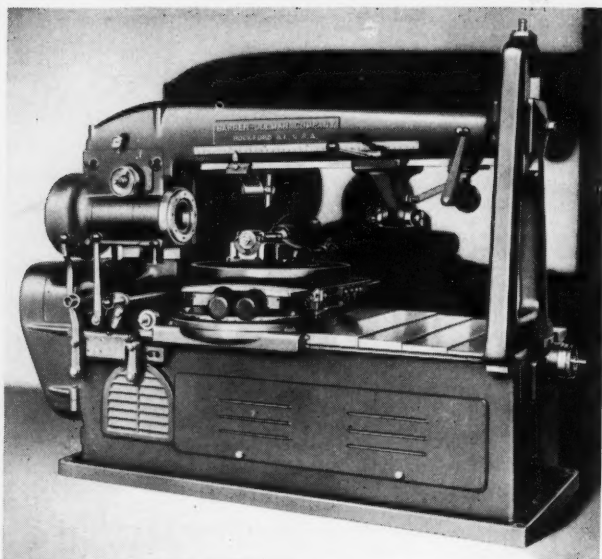
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Barber-Colman Redesigned Type T Hobbing Machine

of a shaft. This same oblique hobbing method can be used on other types of work or the hobbing spindle slide can be turned around so that the ways will be parallel with the bed ways and such work as spiral gears, spur gears, and so on, can be hobbled in the conventional manner.

In the oblique feeding method, the hob is fed across its entire face and in the operation of hobbing a taper spline, for which a tapered hob is required, the longest teeth enter the work first and cut the deepest part of the keys, which are at the very end of the shaft. As the hob moves along the shaft it also moves across so that the progressively shorter teeth cut the shallower

when feeding in the conventional manner.

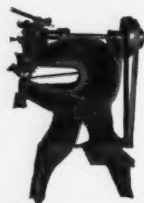
One of the changes consists in moving the hob spindle shoulder back in order to accommodate standard hobs to 4-in. diameter by 4-in. length, which also permits a greater number of settings to be made.

The operating and controlling mechanisms for the Type T machine are somewhat different from the ordinary hobbing machine. An additional feed screw is provided in the lower swivel slide to give the hob its longitudinal traverse. A micrometer dial on the work slide permits operators to read the exact height of the center of the work spindle above the center

portion of the spline until the end is reached. A hob of given size can be used on a variety of tapers on a shaft of given diameter but for each different diameter a separate hob is required.

The advantage of feeding the hob across its entire face also applies to standard hobbing work when the oblique feeding method is used, placing small uniform loads on each tooth and making possible the maximum hobbing life. New settings are made on

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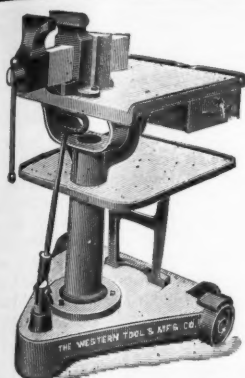
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Individual motor drive to spindle. Ball bearings throughout. All moving parts totally enclosed insuring absolute safety. Available with one to four spindles.

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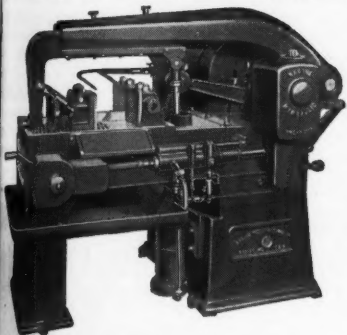
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Capacities 10"x10" up to 14"x20".

For the most economical sawing and for the most rapid production work in large stock the RACINE Heavy Duty Hydraulic Machines are unmatched in the field. On RACINE Hydraulic Saws your metal sawing jobs from the thinnest walled tubing to large die blocks are swiftly and correctly cut due to the accuracy of control over pressure and feed. Such controlled operation gives the maximum in production with the longest blade-life.

The RACINE line offers the correct machine to fit your job—sizes 6" x 6" to 14" x 20" standard or fully automatic types. Send for full details.

"Let RACINE engineer your metal cutting problems."

"Standard the World Over"

RACINE TOOL & MACHINE CO.

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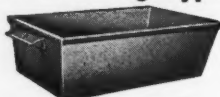
1770 STATE STREET

line of the hob spindle and a similar dial on the main feed screw shows the exact dimension between the spindle nose and the center line of the hob carriage unit. A scale is mounted on the overarm to aid in positioning a fixed stop for loading work into the machine. All change gear trains are contained in a single large gear box on the left hand side of the machine, permitting a complete change gear set-up to be completed in one position.

The overarm has been redesigned for a larger cross section and heavier construction, providing greater rigidity and

presenting a more streamlined appearance. Chromium plate telescoping guards on the bed ways and hob ways protect these ways from dirt chips. The hob slide can be swiveled through 360 deg. and may be set at an angle for hobbing. Tapered hob spindles can be furnished when it is desired to obtain extra fine finish and greater accuracy. Hollow-type hob spindles can be furnished to accommodate shaft type hobs or interchangeable hob spindles, permitting the handling of jobs which require unusually small diameter hobs for hobbing close to a shoulder for hobbing a worm gear which mates with a small diameter worm.

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Lots of 50
\$1.00 each

20" long x 12" wide x 6 1/2" deep.
16 ga., drag holes and handles both ends.

Lots of 100 & 200 less 3%; 300 up less 5%

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BUSHINGS**

Gleason No. 7 Revex Straight Bevel Gear Rougher

A straight bevel gear roughing machine designed to produce a correct tapered tooth slot very rapidly, to known as the Gleason No. 7 Revex has been brought out by the Gleason Works, 1000 University Ave., Rochester, N. Y. The machine is suitable for the rough-cutting of straight bevel gears to 14 in. pitch diameter and 6 to ratio in large or medium quantities.

The outstanding feature of the No. 7 machine is the close roughing both to the taper and the profile shape of the tooth. Other important features are the high rate of production, and the speed and ease of setup and operation. Fast cutting is said to be possible because of the rigid construction of the machine and the small number of moving parts. The use of a hydraulic chuck and hydraulic movement of the work head are also said to add to the speed of the machine as well as the

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OTC GRIPOMATIC PULLERS


PREVENT PRODUCTION DELAYS

Conserve time and man power. reduce accidents — with OTC GRIPOMATIC PULLERS. Automatic grip prevents slipping. Capacities 5 to 50 tons.

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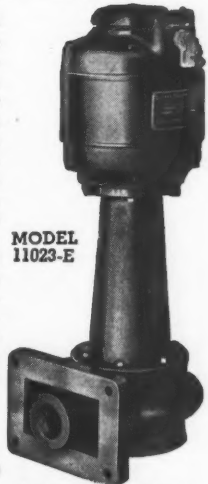
UP DISC FAN PROTECTS MOTOR WINDINGS

RUTHMAN GUSHER COOLANT PUMPS

Patented cup disc fan built into the upper part of the motor prevents oil or dirt from getting on the motor windings. Just another reason why you can expect long and efficient service from Ruthman Gusher Coolant Pumps.

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A complete line of Coolant Pumps from 1/30 to 2 H.P. in types and capacities up to 200 gal. per minute, a pump for every requirement you may have. Ruthman Gushers come in immersed types, tank units, pipe-connected types, flange mounted types and plain drive types. There is a Ruthman Gusher Coolant Pump to meet every type of machine tool coolant requirement. Sheets giving dimensions and performance curves are yours for the asking.



MODEL 11023-E

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Positive internal gaging to fractions of .0001"

COMTORPLUG

For all precision bores.



Automatic 2-point gaging—actually ANALYZES a bore, showing size, out-of-round, tapers, barrel shape, etc.

In 5 minutes any operator can learn to use this unique gage with complete accuracy. Widely employed on ordnance, airplane, automotive and other precision work.

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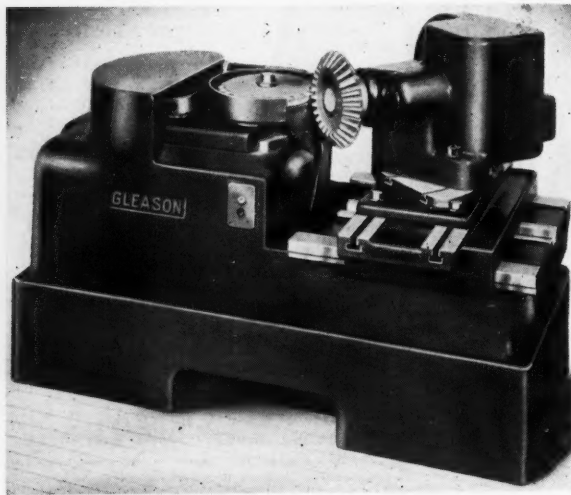
THE COMTOR CO.
WALTHAM, MASS. EST. 1928

convenience of operation. A minimum of attention is required since only the changing of work and the pushing of the starting button are needed to operate the machine.

The proper taper and profile shape of

head, and clamping of the head. The indexing of the work spindle is controlled by change gears. Lubrication of the machine except for the electric motors is entirely automatic.

Specifications of the Gleason No.



Gleason No. 7 Revex Straight Bevel Gear Rougher

Revex Straight Bevel Gear Rougher are as follows: maximum pitch diameter (6 to 1 ratio), in.; coarsest pitch, 3 D. greatest face length, 2 in.; extreme ratio (shafts 90 deg.), 6 to 1; cutter diameter, 15 in.; index range, 13 to 100; cut speed (ft. per min.), 75 to 160; feed rate (seconds per tooth), 4 to 33; work spindle — diameter to hole (large end), 3-2 in.; taper per foot, 1/2 in.; depth of taper, 6 in.; diameter of hole (15 1/4 in. deep), 3 1/4 in.; diameter of hole through, 3 1/2 in.; floor space of machine (approximate), 40 x 85 in.; net weight (approximate), 9,000 pounds.

the tooth slot are said to be obtained by the combined effect of the shape of the cutter blades and a horizontal motion of the cutter spindle. A disc type cutter which has blades extending radially outward from the cutter body is used and is mounted to rotate in a horizontal plane. One cutter covers a limited range of gears and pinions.

A single hydraulic control operates the work head for changing blanks, including chucking, movement of the

Fellows No. 20M Red Liner

The Fellows Gear Shaper Company, 78 River St., Springfield, Vt., has recently placed on the market a machine for checking gears which will handle spur or helical gears up to 18 in. diameter. The machine, to be known as the No. 20M Red Liner, operates on the same fundamental principle as the regular Red Liner but is arranged to handle gears on centers which are

Hart's MILLING FIXTURES and DIVIDING HEADS FOR FAST, ACCURATE INDEXING



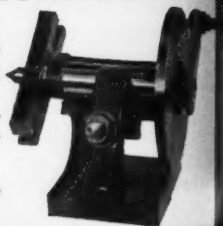
Heads will divide into all numbers up to 16 and even numbers to 32. Can be mounted quickly and easily on Hart's Milling Fixtures.

Fixtures can be furnished separately for holding stock from 3/8" to 5".

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Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S. Inexpensive — Last for years. Write for Circular

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STAR pioneered with the first "Moly" blade with the all-over copper finish—next with the modern metal box—now STAR leads with the first tungsten blade with an all-over protective finish. Every GREEN blade is a STAR tungsten blade.

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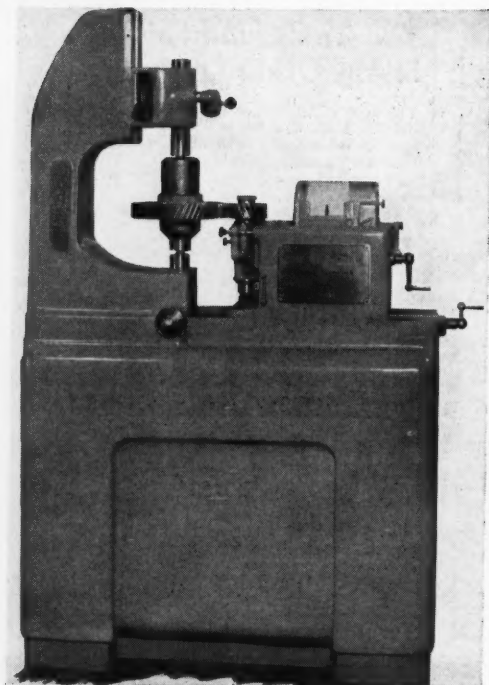
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December, 1940

MODERN MACHINE SHOP 225



Fellows No. 20M Red Liner

justable. The lower center is adjustable to present the gear in the correct relationship to the master gear, and the upper center for handling gears or arbors of different lengths. The machine can also be arranged for checking internal gears by the use of a suitable holding fixture.

The No. 20M Red Liner is equipped with a 1/20 h.p. motor capable of oper-

ating on a.c. or d.c., and can conveniently be operated from a regular light socket. The machine can also be operated by hand. The charting mechanism is similar to that employed on a regular Red Liner. The machine is said to be particularly applicable to airplane engine gears and other classes of work demanding a high degree of accuracy in inspection.

Gaertner Bore Inspection Telescope M2125

To meet the need for a fine inspection telescope for the inspection of gun bores and similar cylindrical surfaces, a new inspection telescope has been developed by The Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago, Ill. The instrument provides a clear and detailed view, much enlarged, of the inner wall of gun barrels, tubing, pipes, and many other hitherto inaccessible inner surfaces. Small holes, cracks, pits, scratches, and other defects are immediately visible. Inspection can be made in tubes of 1 to 4-in. diameter and, by means of extensions, to a depth of 20½ feet.

The main unit of the bore inspection telescope permits inspection of bore tubes to a depth of 4½ ft. The instrument consists of an illuminating bore telescope tube containing the necessary optics, and a removable eyepiece. Extension tubes each 4 ft. long, containing the necessary optics can be added to the main unit to correspond



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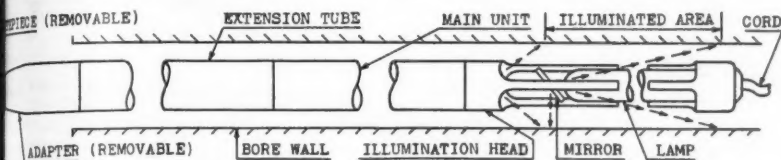


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and can increase the depth of inspection. method of connecting the extension is such as to ensure a rigid tube. The illuminating head carries a spe-

supplied with three spare lamps, 25 ft. of lamp cord, a 6 volt transformer, and a wooden instrument case to accommodate extension tubes supplied with the



Drawing of Gaertner Bore Inspection Telescope

Inspection tubular lamp, the clear portion of which is 6 in. long. An adjustable in- mirror enables the observer not to see the inner surface of the but also to obtain a direct view right angles to the wall. The image the wall formed by the mirror ap- in the center of the field of view the view is such as would be seen it possible to bring the point un- inspection within 2 to 8 in. of the

instrument. If desired, centering discs can be used which will align the tele- scope with the bore into which it is inserted.

Delta Sectional Drill Press

Delta Manufacturing Company, 658 E. Vienna Ave., Milwaukee, Wis., has brought out a drilling unit designed to be assembled in multiples so that the user can add as many spindles as may be required to handle his work. Thus



Here's how to get real value from your grinding wheels. Dress and true them regularly. Use Vincent Improved Hunting- ton dressers equipped with Vincent high-carbon tool steel outters. Your mill supply distributor can supply them, and they cost no more than the ordinary kind.

Insist on the dresser with the aluminum finish.

Write for descriptive catalog sheets.

THE VINCENT STEEL PROCESS CO.

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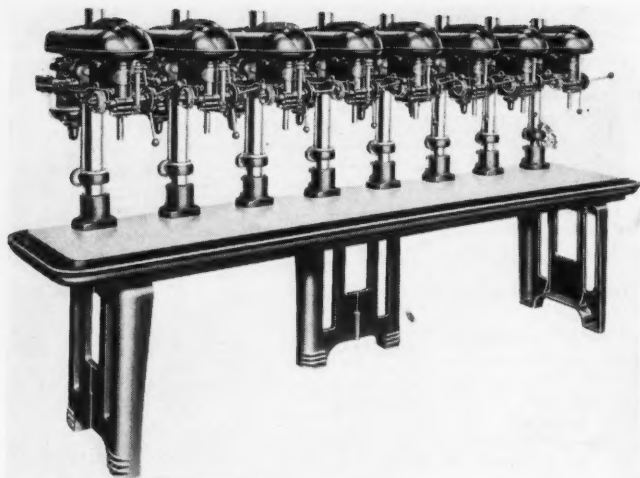
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Bronze Metal"

10 years ARGUTO without a drink—

ARGUTO OILLESS BEARING CO.

Wayne Junction, Philadelphia, Pa.



Delta Sectional
Drill Press

It is possible to build up a drill press with anywhere from one to an indefinite number of spindles, with the drilling heads spaced to fit the user's individual requirements.

Any type of Delta 17-in. or 14-in. heads can easily be installed, at any center distances, providing the maximum of flexibility. All 17-in. or all 14-in. heads may be used, or a combination of both. The working surface of a table section is 23 $\frac{3}{4}$ in. deep by 30 in. wide, with end sections 23 $\frac{3}{4}$ in. deep by 35 in. wide, and each section has room for two spindles with a minimum of 15 in. from center to center between spindles. The tables are of heavy, rugged construction, and are accurately ground and fitted.

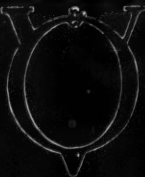
The unit illustrated is an 8-spindle machine, built up with four table sections and eight 17-in. drill press heads.

The table surface of this unit is 23 $\frac{3}{4}$ x 125 in., with center-to-center distance between spindles of 15 in. Maximum distance from chuck to table is 26 in. The table has a 1 $\frac{1}{2}$ in. coolant trough. This unit is an example of the manner in which a number of drilling and tapping heads can be located in

row with one continuous table, thus eliminating the necessity of transferring work from one machine to another.

Hannifin 150-Ton Hydraulic Straightening Press with Sensitive Pressure Control

The large straightening press illustrated herewith, built by Hannifin Manufacturing Company, 621-631 S. Koin Ave., Chicago, Ill., has a capacity of 150 tons and is provided with a large table to facilitate straightening of steel castings and similar work. The base of the press is designed for installation below floor level to bring the table to convenient height for easy handling.



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ANY MATERIAL
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Sectional
Press

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unit is 22
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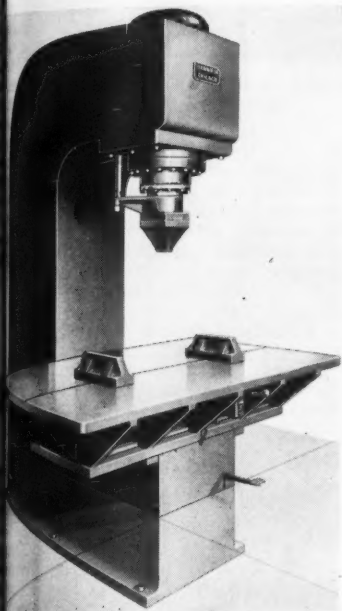
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age and bulky pieces.

The Hannifin sensitive pressure control is used, allowing extremely simple and accurate handling. The operation of this type of control is said to permit unusually rapid handling of straightening operations, with finger-tip or light pedal control of the ram movement and ram pressure. Ram movement, up and down, and pressure control are accomplished by means of the single hand lever or foot pedal. Initial movement of the control lever



Hannifin 150-Ton Hydraulic Straightening Press with Sensitive Pressure Control

moves the ram to move down rapidly under normal pressure. The ram will move down until it touches the work and stop. Movement of the control lever beyond the approach position releases pressure to be exerted by the ram with working pressure proportional to the distance the control lever is moved. Any required ram pressure is obtained by moving the control lever up. Releasing the control lever at any point automatically returns the

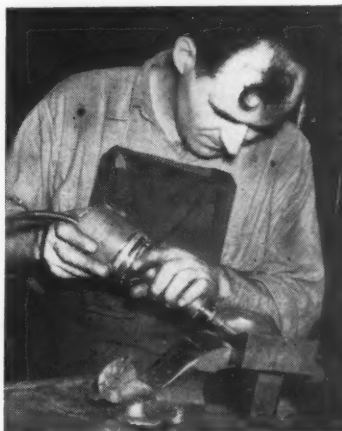
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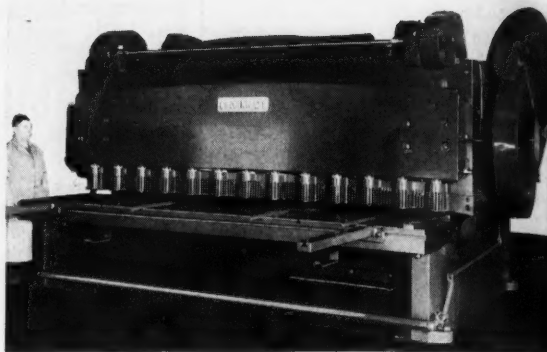
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ram to top position with a high speed return stroke.

The motor-driven hydraulic power unit is built into the base of the press. The press frame is welded and all piping is concealed. Dimensions are: stroke, 20 in.; gap, 30 in.; reach, 30 in.; table, 54 x 96 in. Capacity, 150 tons.



Cincinnati 1-In. x 12-Ft. Shear Built for U. S. Navy Yard

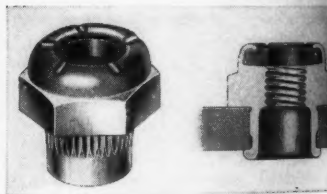
Cincinnati 1-In. x 12-Ft. Plate Shear

The 1-in. x 12-ft. capacity plate shear shown in the illustration has been built by The Cincinnati Shaper Company, Cincinnati, Ohio, for the U. S. Navy Yard, Norfolk, Va. The machine is of rolled steel plate construction and is 12

ft. 3 in. between housings. It is equipped with fluorescent light, shearing gage, hydraulic holddown, micrometer ball bearing back gage, four edge solid one-piece knives. Net weight is approximately 80,000 pounds.

Elastic Clinch Type Stop Nut

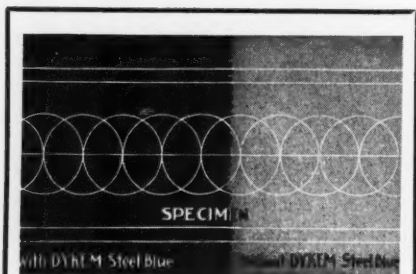
A clinch type self-locking stop nut with knurled shank for fastening sheet metal assemblies in which the



Elastic Clinch Type Stop Nut

must be readily removed and returned to position is now being offered by Elastic Stop Nut Corp., 2332 Vaux Rd., Union, N. J. To install the nut, a hole is drilled in the structure and the knurled shank pressed into the hole. The mouth of the shank is then spread against the back of the structure to effect a clinching hold. The knurling gages the drilled surface and thus assists in eliminating any turning of the nut.

The head of the nut is fitted with



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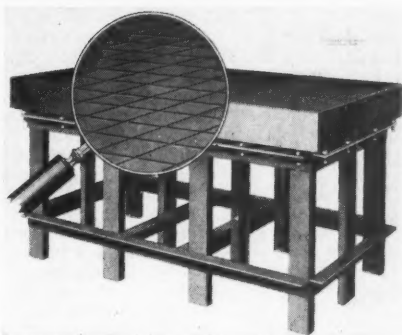
THE DYKEM COMPANY
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(In Canada: 3194 Dundas St. W., Toronto, Ont.)

vulcanized fiber collar which characterizes all types of Elastic Stop Nuts. The collar, being unthreaded, resists the entrance of the screw, thereby automatically taking up all thread play and bringing the load-carrying thread faces of the nut and screw into a tight pressure-contact. As the screw thread impresses its way through the collar, this pressure is maintained and increased to such a degree that the screw, it is claimed, cannot work loose even under the most severe vibration. Because of the resilient character of the fiber collar, the screw may be removed and re-used repeatedly without the loss of its locking action.

The stop nut is available in a complete range of sizes, thread systems, shank lengths, and materials.

Challenge Semi-Steel Lapping Plate

To provide a means for accurate lapping of delicate joints, The Challenge Machinery Company, Grand Haven, Mich., has designed a semi-steel lapping plate which has $\frac{1}{16}$ -in. grooves,



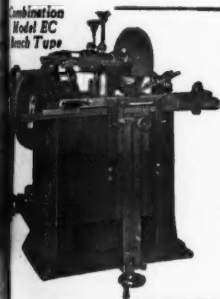
Challenge Semi-Steel Lapping Plate

spaced $\frac{1}{2}$ in. apart, running the full length and width of the surface.

Joints required to hold oil can be properly lapped, it is claimed, through the use of this plate, which is specifically designed to assure a perfect fit when lapping in metal-to-metal joints on which no gaskets, shellac, or sealer of any kind are used.

The Challenge Semi-Steel Lapping Plate is made of high grade semi-steel,

Combination
Model EC
Each Type



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HACK, BAND, CIRCULAR SAWS**

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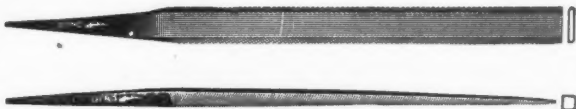
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specially heat treated and machined. It can be used on crank cases, cylinder heads, end bells, gear housings, and other parts that must be perfectly lapped to avoid oil leaks. A specially designed, all-steel stand is available with the plate. It is arc welded for rigidity and strength, and is equipped with closely-spaced lock leveling screws that enable the user to keep the lapping plate level at all times.

The plate is built in a wide variety of standard sizes, ranging from 8 x 8 in. to 52 x 144 in. Special sizes can be built to order.



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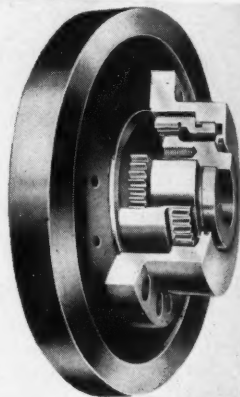
1-CARAT DRESSER / 16 stones per carat / for wheel Dia. 6" to 12"
 2-CARAT DRESSER / 12 stones per carat / for wheel Dia. 12" to 24"
 4-CARAT DRESSER / 8 stones per carat / for wheel Dia. 24" to 36"

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Manger Flexible Coupling

To meet conditions where space limited and at the same time full flexibility is desired, a coupling to be known as the Manger Flexible Coupling has been developed by Farrel-Birmingham



Manger Flexible Coupling

Company, Inc., 381 Vulcan St., Buffalo, N. Y. The coupling is especially efficient in connecting a shaft direct to flywheel, brake drum, or flange, but is equally applicable for connecting to free-end shafts in combination with solid, flanged, half coupling, which provides a remarkably close-coupled connection.

Compensation for misalignment is provided by an internal sleeve which floats between an externally geared hub and an internally geared cover sleeve. The internal sleeve, which engages the hub and outer sleeve, is

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slide or rock, adjusting perfectly for differences in alignment.

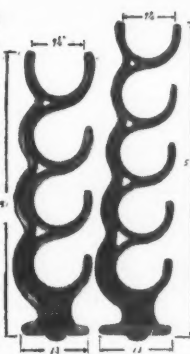
The gear teeth are accurately generated and the external teeth are ground, providing full freedom to the rotating sleeve within the design limits of the coupling. Compensation is also provided for offset, angular, and compound misalignment without resistance to free lateral float of the connected shafts. Contact areas are large, and the heavy oil which lubricates the contact surfaces provides a cushion against shock without the use of flexing materials.

Yohe Five-Arm Rack

A five-arm stock rack designed to provide a 20 per cent increase in carrying space and to increase the proportion of stock stored at convenient rack height is now being marketed by Wm. S. Yohe Supply Co., 501 Gibbs St., N. E., Canton, Ohio. The rack occupies no more floor space than the company's standard four-arm rack and, like the latter, is self-balancing.

The five-arm rack, cast of high grade

machinery iron stands only 57 in. high, has arm capacity of 10-in. diameter, with opening over hooks of $4\frac{1}{4}$ in. Yohe racks can be located against a wall or in any position in the shop, either singly or with backs overlapping. The flexibility thus obtained permits the storage of all types of bar or tube stock. Both four and five-arm racks are shown.



Yohe Stock Racks

Toledo Variable Speed Transmission

The variable speed transmission made by The Toledo Timer Company, 2224 Albion St., Toledo, Ohio, is now being made in two types, Types 1-A and 2-A, for applications requiring maximum speed variations up to 3-1 ratio. The maximum horsepower rating of the

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 $6\frac{1}{2}$ " Turning Length
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90 to 180 r.p.m.
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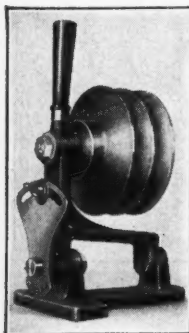
Spindle speeds are obtained by increasing and decreasing center distance between motor and spindle, thus obtaining an infinite number of spindle speeds ratio of 1:2. Back gear ratio—1:4.

A positive, automatically operated turret clamp insures rigid support for the turret.

A turn of a handwheel gives exact spindle speed, indicated by direct-reading dial.

Write for complete details.

Type 1-A is $\frac{3}{4}$ h.p. and of the Type 2-A is 4 h.p. The transmission is easy to install and can be mounted with perfect alignment in any position. The convenient size of the unit requires minimum space for installation. It is simple to operate, only one movement of the lever arm being necessary for speed change, and the change can be made without stopping the machine.



Toledo Variable Speed Transmission

The transmission is designed to provide an infinite range of speeds from 1-1 to full 3-1 ratio. A new wheel design provides increased torque and definitely fixes the minimum pitch diameters while assuring normal belt wear. Large self-lubricating sintered bronze bearings with a large lubricant reservoir eliminate the necessity for frequent

lubrication of bearings.

The shaft is of unusually large diameter. A sector plate serves as a dial indicator and locking medium. Standard V-type belts of any make desired can be used and the transmission can be used with any speed motor.

Engineering and Trade Information

Hobbing Data. Barber-Colman Company, 207 Loomis St., Rockford, Ill., is now distributing a book containing a collection of case histories of actual field performance of Barber-Colman hobbing machines and hobs, the whole bound together in an attractive multi-ring binder under the title "Hobbing Data."

"Hobbing Data" is a comprehensive review of the complete hobbing service offered by Barber-Colman Company. The first 32 pages comprise a condensed catalog of all Barber-Colman machine and small tool items, with a brief description and specifications of hobbing machines, hob sharpening machines



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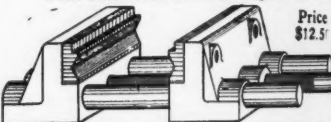
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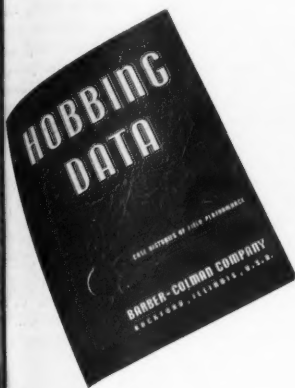
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sharpening machines, hobs, cutting cutters, and reamers. The small ones are covered only in a general way. Complete information is furnished in the Standard Tool Catalog K. On the machine catalog, however, sufficient information is given to determine the adaptability of any of the machines to any specific conditions.

The initial edition of "Hobbing Data" comprises the first six of a projected series of exceedingly informative and useful sheets. Each sheet tells the com-



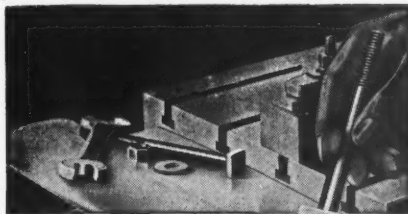
story on a specific production hobbing operation, giving all the pertinent data as well as pictures of the operation, the finished gear or spline and the completed product of which it is a part. In each case authentic and confirmed production data is gathered on the spot, to comprise an accurate report of actual production conditions.

This data will be extremely valuable to production men as it will enable them to compare results with what they themselves are achieving. Examples have been selected with a view to help generally to improve all hobbing operations and to suggest the benefits that may be derived from modern hobbing equipment.

Each "Hobbing Data" loose leaf will be distributed from time to time to all who receive the original edition of the binder, so that they may be served for future reference. Thus the binder will gradually build up a library of actual hobbing operations that will be of great help in planning production operations or in im-

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proving existing conditions.

A copy of "Hobbing Data" will be sent without charge to any mechanical engineer or executive.

Selflube Porous Bearings, product of the Keystone Carbon Co., Inc., St. Marys, Pa., are illustrated and discussed in a 24-page catalog published by this firm. A complete listing of sizes and code numbers is given throughout the catalog, copy of which can be obtained free upon request.

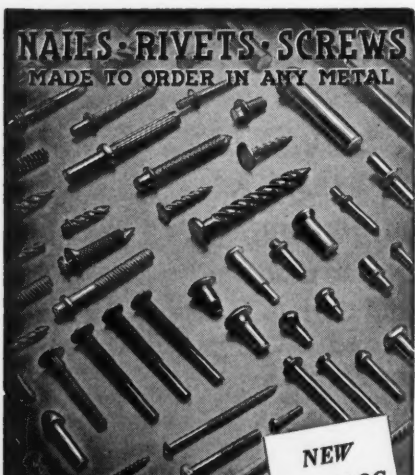
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Illustrated Catalog

"Cutting and Grinding Facts." The Sun Oil Co., Philadelphia, Pa., is now issuing a 60-page booklet entitled "Cutting and Grinding Facts" which is said to not only illustrate more than 46 of the most modern machine tools offered by the master tool builders, but also give actual performance data about these machines running at rated capacity.

The booklet contains machining data on the latest lathes, milling machine hobbors, drillers, and grinders. The data includes such important information as operation, machine used, materials being machined, spindle speed, depth of cut, feed, and cutting lubricant used. In addition to this performance data, each page of the booklet carries a brief, but valuable, statement that applies to metal working.

Besides the pages devoted to machining and grinding operations, the booklet also devotes several pages to other metal working operations such as planing, threading, cold rolling, quenching and tempering, metal cleaning, and so on.

Copy of "Cutting and Grinding Facts" will be sent free of charge to anyone addressing a request on company letterhead to Sun Oil Co. Dept. No. 5, Philadelphia, Pennsylvania.

CP Compressor Bulletin No. 726. 30-page, profusely illustrated bulletin containing descriptive information on the construction details, features, use and operation of CP Classes O-4 (Two-Stage) and O-DE (Single-Stage) Motor-Driven Air and Gas Compressors is now being published by the Chicago Pneumatic Tool Co., 6 E. 44th St., New York, New York.

Copy of Bulletin No. 726 will be sent free of charge to anyone requesting on his company letterhead.

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WRITE FOR BULLETIN

TRICO FUSE MFG. CO. Milwaukee, Wis.

"The Story of Modern Industrial Weighing" is the title of a broadside which is now being issued by The Exact Weight Scale Co., Columbus, Ohio, illustrating and describing numerous types of Exact Weight Scales for use in checkweighing, counting, balancing, compounding, testing, and handweighing. Photographs showing the application of Exact Weight Scales in various industries are included. Copy broadside free upon request.

Nicholson Special File Data Sheet No. 4

A data sheet discussing the use of stainless steel has been prepared for distribution by the Nicholson File Co., Providence, R. I. The data sheet analyzes the problem created by the abrasive action of stainless steel on the teeth, tells why special files should be selected, and suggests the correct method for using them. Copy of Data Sheet No. 3 free upon request.

Turret Lathe Earning Power. In this book, now being distributed by Jones & Lamson Machine Company, Springfield, Vt., the writers have endeavored to present and answer 12 fundamental

questions that should form a basis for comparison of turret lathe values relative to the earning power of the machine. The book should be a valuable guide to purchasers of turret lathe equipment.

The book contains 28 pages, 10 x 13 in. in size, bound with wire binding. The 12 questions are presented on the first two pages of the book, with the page numbers for the pages upon which the answers will be found. Each answer occupies a double spread of pages and includes a concise description, illustrated, of the parts of the machine involved in the question. The questions do not relate directly to the machines, but rather to features necessary for precision work, necessary to take full advantage of modern cutting tools and production methods, requirements of design for operation at high cutting speeds, advantages gained by the use of simplified feed and speed controls, production economies derived from an effective lubrication system, safety features, and so on.

The book is beautifully printed on heavy colored stock. Copy free to any mechanical executive upon request.



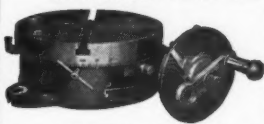
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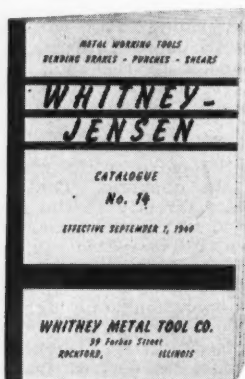
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Whitney-Jensen Catalog No. 14. Whitney Metal Tool Co., 110 Forbes St., Rockford, Ill., is now issuing a 92-page catalog covering Whitney-Jensen metal working tools. Tools illustrated and



described include various types of bending brakes, punch presses, benders, notchers, shears, punches, dies, hammers, aircraft rivet squeezers, and so on. Copy of Catalog No. 14 free to anyone addressing a request on his company letterhead.

Carboloy Engineering Bulletin GT-123. A 16-page engineering bulletin devoted to the machining of steels with cemented carbide tools has been released by the Carboloy Co., Inc., 11143 E. 8 Mile St., Detroit, Mich. The bulletin, which is designated as the GT-123, covers tool design and selection; use of coolants; chip breaker design and use; grinding of chip breakers; machine maintenance design and equipment considerations; tables on feeds, speeds,

depth of cut, and grade selection for different types of steels; formulas for calculating horsepower requirements, and so on. The bulletin also contains a supplement covering, in tabular form, recommendations for machining cast iron, non-ferrous, and non-metallic materials.

Entirely new material in the bulletin includes: (1) detailed recommendations as to grinding and determination of relief angles for tools, (2) recommendations as to tip thickness for "interrupted" cuts as well as regular cuts, (3) detailed recommendations as to shapes of chip breakers and methods of grinding them, and (4) methods of determining whether cutting speeds are too low for the job in question.

Tables of cutting speeds and feeds have been revised largely as the result of the introduction of the new 78B grade cemented carbide. Particularly noteworthy are the much higher "average condition" cutting speeds now being recommended for large work. Front and side relief and rake angle recommendations are now standardized for average shop work regardless of the steel being cut, though the recommendations differ between tools for small and large work. Copy free upon request.

Capewell Metal Cutting Saws are the subject of a 12-page booklet now being distributed by The Capewell Manufacturing Company, 58 Governor St., Hartford, Conn. Specifications are given for Capewell hand, flexible hand, and power hack saw blades; flexible metal cutting band saw blades, and wood cutting band saw blades, together with a concise description of each type. Copy free upon request.



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Oxygraph and Travograph Gas Cutting Machines. A 24-page bulletin featuring the No. 6-A Oxygraph and the Nos. 10, 40 and 41 Travographs has been published by Air Reduction, 60 E. 42nd St., New York, N. Y. These machines will cut an unlimited variety of shapes from steel plate, slabs, billets, and forgings. Pages 4 to 13 are devoted to examples of the "Visible Evidence of the Scope and Cost-Paring Possibilities" of this group of Airco gas cutting machines.

All of the machines operate on the pantograph principle so that one or several cutting torches are made to conform exactly to the movement of the tracing device. The second half of the book is devoted to an individual treatment of each of the machines discussed therein. Features of construction and operation are discussed in detail, and standard equipment and electrical requirements are listed. The last two pages are devoted to an interesting treatise giving helpful hints for machine gas cutting and including an approximate guide for Airco machine gas cutting, with suggested tip sizes, oxy-

gen and acetylene pressures, cutting speed in inches per minute, and approximate gas consumption. Copy free upon request.

Hart Milling Fixtures and Dividing Heads are the subject of an illustrated and descriptive circular which is now being issued by the Hart Machine Co., 26 Mather St., Dorchester, Boston, Mass. Copy free upon request.

Skilsaw Portable Electric Tools. Skilsaw, Inc., 5037 Elston Ave., Chicago, Ill., has announced the publication of Catalog No. 42 in which the complete line of portable electric tools manufactured by this firm is illustrated and described. Practicability of all the tools and their construction points are shown in working pictures and in detailed specifications given for each tool. Tools presented in the catalog include drills, belt sanders, grinders, disc sanders, blowers, bench grinders, and floor sanders. Copy free to any mechanical executive upon request.

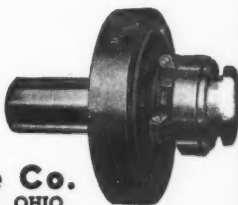
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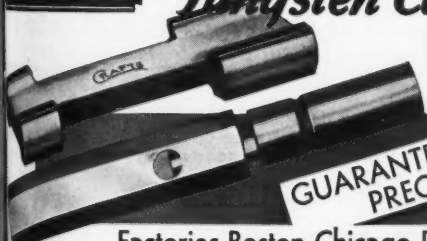
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South Bend 16-in. Lathe Catalog. Catalog No. 16-T, illustrating and describing the new 16-in. Series "S" South Bend Precision Lathe, has been published by the South Bend Lathe Works, South Bend, Indiana.

The catalog features the 16-in. Series "S" Lathes, which are made in three types: Toolroom, Quick Change Gear, and Standard Change Gear. Each type of lathe is available with underneath motor drive, pedestal motor drive, and countershaft drive. The Toolroom Lathes are made in 6-ft., 7-ft., and 8-ft. lengths. All other models are made in five bed lengths—6, 7, 8, 10 and 12 ft. Attachments for toolroom production and maintenance work are described, and features of construction are outlined in detail. Copy free upon request.

Paint Spray Booth Fan. A paint spray booth fan with guaranteed performance ratings which has been placed on the market by the DeBothezat Ventilating Equipment Division, American Machine and Metals, Inc., East Moline, Ill., is the subject of Bulletin 540 issued by this firm. The fan is said to assure required protection against the hazards of spray painting under all operating conditions. Built to Underwriters' specifications, the fan is corrosion-resisting and non-sparking. The motor is substantially mounted and perfectly balanced outside the fan housing on an adjustable base, and power is transmitted by V-belts through a vapor-proof drive chamber. Fan wheels are of die-formed aluminum and the blades are easily removable for cleaning. Complete ratings are given for the standard sizes of 18 to 42 inches.

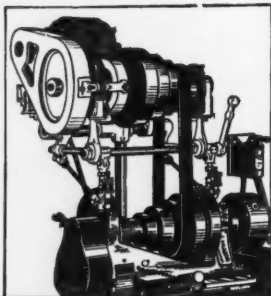
Copy of Bulletin 540 free upon request.

G-E Instruments and Time Switches are the subject of Bulletin GEA-2753 released by the General Electric Co., Schenectady, N. Y. Among the instruments illustrated and described are hook-on volt-ammeters (a. c.), portable test instruments (a. c. and d. c.), inkless recording instruments, strip-chart and round-chart recording instruments, and time meters.

Time switches covered include general-purpose automatic time switches, automatic process time switches, and automatic repeating time switches. Copy of Bulletin GEA-2753 free upon request.

Gisholt Performance Data Sheets Nos. 62 to 65 are now available from the Gisholt Machine Co., 1219 E. Washington Ave., Madison, Wis. The data sheets describe representative metal-turning jobs performed on turret and automatic lathes, and an example of static-dynamic balancing on a Gisholt Dynetric Balancing Machine. The metal-turning installation stories are based on the production of oil well plugs, steam traps, and tractor hub bushings. They include such data as operation sequence, feeds, cutting speeds, tolerances, and machining times. Photographs and drawings are used to illustrate the machining of the workpiece and the machine tooling.

The balancing data explains how the elimination of unbalance produces smoother running spindle whorls and longer bearing life for a manufacturer of rayon spinning machines. A full description is given of the methods employed for locating, measuring, and removing the unbalance in the spindle whorls. Data sheets Nos. 62 to 65 free upon request.



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Brown Engineering Brochure. A brochure containing a series of bulletins covering various products marketed by the Brown Engineering Co., 120 N. 3rd St., Reading, Pa., is now being distributed by this firm. The bulletins are devoted principally to illustrating and describing Jackson Time-Saving Vises, Brown Buffer-Slot Couplings, Brown Mile-Pull Clutches, Brown Sectional Stock Racks, and Kanti-Lever Flexible Couplings. Copy of brochure free upon request.

"Modern" Safe-T Guards for all punch press work where the hand enters the danger zone to insert or remove a part to be blanked or formed are described and illustrated in an eight-page folder issued by the Quality Hardware & Machine Corp., 5831 Ravenswood Ave., Chicago, Ill. Copy free upon request.

"Manual of Welding and Fabricating Procedures for IngAclad Stainless Clad Steel." A 16-page booklet issued by Ingersoll Steel & Disc Division, Borg-

Warner Corporation, 310 S. Michigan Ave., Chicago, Ill., discusses the most recent advances in the methods of fabricating and welding stainless clad steel. The booklet, although it bears the same title, differs from previous editions in that it is entirely new in form and in presentation with a completely revised text and diagrams illustrating welding and fabricating procedures. Improvements in technique to assure the maximum strength, corrosion resistance and ductility in welded fabrication have been emphasized.

Fabricators and users of corrosion resisting alloys will find many phases of forming, bending, welding, heat treating, cleaning, grinding and polishing of stainless clad steel covered in the booklet. Featured in the manual is a chart showing the corrosion resistance of two types of IngAclad to a long list of acids, alkalis and various corrosive liquids and materials in common usage.

In addition to descriptions and diagrams of procedures, the booklet is well illustrated with applications of IngAclad in the food, chemical, paper, and other process industries and also shows many applications for polished IngAclad sheets. Copy free upon request.

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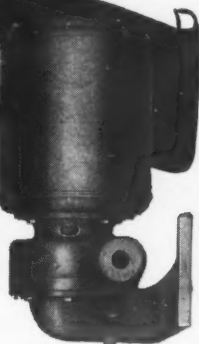
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"Flexoid Speed Control." This is the title of a folder which is now being issued by The Smith Power Transmission Co., 1545 E. 23rd St., Cleveland, Ohio, illustrating and describing Flexoid Speed Control Units for modernizing and motorizing machine tools. The folder, which is designated as the No. FSC-124-A, shows various applications of the Flexoid units and gives new and complete ratings. Copy free upon request.

Page "Shaped Wire." Buyers and users of shaped wire will be interested in a 12-page booklet on Page "Shaped Wire" issued by Page Steel and Wire Division, American Chain & Cable Company, Inc., Monessen, Pa. In addition to illustrating a number of the many shapes of wire available, it gives useful information to help in specifying grade, temper and finishes. A chart showing methods of calculating the areas of common shapes and tables showing the applications of various analyses of Page-Allegheny Stainless Steel Shaped wire are also included. Copy free upon request.

Penco Steel Lockers, Cabinets, and Shelves are the subject of a 28-page, pocket-size, illustrated booklet, designated as the No. 44 Series A, which is now being issued by the Penn Metal Corp. of Penna., 36 Oregon Ave., Philadelphia, Pa. The booklet gives detailed specifications and prices of heavy gauge steel lockers, cabinets, and shelving, summarizes applications, and points out possible savings in floor space, material handling time, and tool control operations. Copy free upon request.

"Drive Away Those Dark Spots Wherever People Work" is the title of a 16-page illustrated folder now being issued by the McGill Mfg. Co., 1500 N. Lafayette St., Valparaiso, Ind., describing the features, uses, and advantages of McGill Portable Lamp Guards. Copy free upon request.

G S Machinists' Tools. A four-page folder illustrating and describing G S Machinists' Tools has been released by the George Scherr Co., Inc., 130 Lafayette St., New York, N. Y. Among the tools covered are machinists' combination sets, adjustable angle depth gages, surface gages, slide caliper rules, stainless steel rules, spring calipers and dividers, scales, magnifiers, and center thread, and thickness gages. Copy free upon request.

Michigan Tool Folders. A series of looseleaf folders covering a number of products of the Michigan Tool Company, 7171 E. McNichols Rd., Detroit, Mich., is now being distributed by this firm. A complete illustrated folder is devoted to each of the following: Michigan Duplex No. 359 Gear Finisher, Michigan 860-A Rotary Gear Finisher, Michigan 860-B Rotary Gear Finisher, Michigan 900 Rack Type Gear Finisher, Model No. 993 Universal Duplex Lapper, Michigan 995 2-Lap Gear Lapper, Michigan 3-Lap No. 991 Gear Lapper, Michigan Gear Speeder Model 1127-B, Michigan Model 1124 "Sine Line" Involute Checker, Michigan Model 1204 "Sine Line" Lead Checker, and "Sine Line" Hob Checking Equipment.


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Niagara Machines for plate and sheet metal work, including presses, punches, squaring shears, and rotary shears, are presented in a concise manner in Booklet No. 106-A issued by Niagara Machine & Tool Works, Buffalo, N. Y. Numerous illustrations of the various types of machines are shown, together with a brief resume of the outstanding features of each machine. Copy free upon request.

J&L 12-In. Fay Automatic Lathe.

This 18-page spiral bound catalog, now being issued by Jones & Lamson Machine Co., Springfield, Vt., contains a complete description of the 12-in. Fay Automatic Lathe, its operation and adjustments, some its tools and attachments, and specifications of the bed lengths in which it is built. Numerous photographs are included of the lathe which is a universal machine, completely automatic in its cycle. Copy free to any mechanical executive upon request.

Carboloy "Watch - Pocket" Size Instruction Manual. What is probably one of the smallest comprehensive instruc-

tion manuals for the use of cutting tools has been developed by Carboloy Co., Inc., 11143 E. 8 Mile St., Detroit, Mich. In every carton of the individually packaged new standard tools introduced by Carboloy recently is now being included a 12-page manual for operators, containing complete information on speeds and feeds to be used with different materials and varying depths of cut; machine recommendations for machining steel; proper use of coolants; tool grinding instructions including types of wheels to be used, wheel dressing, stock removal recommendations, and standard grinding procedure; standard tool angles; design and grinding of chip breakers, and general operating hints.

The booklet, set in small yet perfectly legible type and profusely illustrated with drawings, measures only slightly over 3 x 4 1/4 in., yet contains all the information essential to the use and care of standard Carboloy tools. The prime reason for the booklet is that the introduction of the new standard tools permits their use in a multitude of shops not formerly employing and unacquainted with the technique of using cemented carbide tools.

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- 1 **Lathes**
Catalog No. 16-T, featuring the New South Bend Series "S" 16-in. swing lathes, has just been issued by South Bend Lathe Works, South Bend, Ind.
- 2 **Collet Chucks**
Erickson Steel Co., Cleveland, Ohio, has issued new bulletin detailing precision collet chucks for automatic screw machines.
- 3 **Variable Speed Transmissions**
New circular is available from Toledo Timer Co., 2224 Albion St., Toledo, Ohio. It illustrates and describes variable speed transmissions for control of V-belt driven equipment.
- 4 **Universal Chucks**
"Oneida" Universal Chucks are illustrated and described in folder issued by Westcott Chuck Co., 712 E. Walnut St., Oneida, New York.
- 5 **Presses—Punches—Shears**
New 68-page booklet No. 106-A has been published by Niagara Machine & Tool Works, Buffalo, N. Y. It illustrates and describes Niagara machines for shearing, blanking, drawing and forming plate and sheet metal.
- 6 **Automatic Lathe**
The 12" Fay Automatic Lathe is illustrated and described in new 18-page catalog issued by Jones & Lamson Machine Co., Springfield, Vt.
- 7 **Brakes—Punches—Shears**
Whitney Metal Co., Rockford, Ill., has published new 92-page Catalog No. 14. It details the Whitney-Jensen line of metal-working tools, bending brakes, punches and shears.
- 8 **Universal Milling Head**
Halco Products Co., 14230 Birwood Ave., Detroit, Mich., has issued new folder illustrating and describing the Halco Hi-Speed universal milling head for milling, drilling, boring and counterboring on any angle.
- 9 **Angle Irons—Surface Plates**
Milliken Angle Irons, Bench and Surface Plates are illustrated and described in folder issued by Milliken Machine Co., West Newton, Mass.
- 10 **Machinists' Tools**
Illustrations, descriptions and prices on machinists' tools are included in folder released by George Scherr Co., Inc., 128 Lafayette St., New York, N. Y.
- 11 **Precision Gages**
Just off the press is the Sheffield Gage Book, detailing the design, construction and application of precision gages together with standards and constants useful in practical inspection work. Sheffield Gage Corporation, 1525 East Third St., Dayton, Ohio.
- 12 **Gear Charting and Measuring Machines**
Description and illustrations of the new Illinois Electrical Recording System and what it offers in inspection operation is offered in folder available from Illinois Tool Works, 2511 N. Keeler Ave., Chicago, Ill.
- 13 **Portable Electric Hammer**
Bulletin illustrating and describing the Tornado portable electric hammer has been issued by Independent Pneumatic Tool Co., 604 W. Jackson Blvd., Chicago, Illinois.
- 14 **Metal Cutting Bandsaw**
New bulletin issued by Kalamazoo T & S Co., 507 Harrison St., Kalamazoo, Mich., illustrates and describes the Kalamazoo metal cutting bandsaw.

Ground Flat Stock

Ground flat stock folder MD and handy reference wall chart for the toolroom may be obtained from The L. S. Starrett Co., Athol, Mass.

Cerromatrix Manual

This 36-page booklet is filled with useful and interesting information about Cerromatrix, the versatile alloy for metal-working shops. Cerro De Pasco Copper Corp., 40 Wall St., New York, N. Y.

Chaser Grinder

Bulletin No. 20, issued by The Geometric Tool Co., New Haven, Conn., illustrates and describes the Geometric Chaser Grinder.

Turret Lathe

Morey Machinery Co., Inc., 410 Broome St., New York, N. Y., has issued bulletin illustrating and describing the Morey No. 2 turret lathe.

Threading Machines

New booklet featuring Geometric precision threading machines has been released by The Geometric Tool Co., New Haven, Conn.

Milling Cutters

New catalog titled "Meeting Milling Cutter Requirements" (Catalog No.

25) presents details on Lovejoy milling cutters. Lovejoy Tool Co., Inc., Springfield, Vermont.

21. Hydraulic Surface Grinders

The Hill Acme Co., 6400 Breakwater Ave., Cleveland, Ohio, has issued Bulletin M which contains detailed information on Hill hydraulic precision surface grinders.

22. Hydraulic Cylinders

Hydraulic Cylinder Catalog No. 229 is available from Hanna Engineering Works, 1765 Elston Ave., Chicago, Illinois.

23. Dividing Heads—Milling Fixtures

Descriptive circular featuring milling fixtures and dividing heads for fast, accurate indexing is available from Hart Machine Co., 24 Mather St., Dorchester, Boston, Mass.

24. Flexible Coolant Lines

Folder featuring flexible oil feed and coolant lines is available from American Metal Hose Branch, The American Brass Co., Waterbury, Connecticut.

25. Drilling and Tapping Machines

Bulletin No. 107, featuring Edlund Nos. 2 M. S. and 4 M. S. Drilling and Tapping Machines, is available from Edlund Machinery Co., Inc., Cortland, N. Y.

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Cincinnati Centerless Lapping Machine
Catalog No. G-453. In this 12-page cata-
log, publication of the Cincinnati Grind-
ing Co., Incorporated, Cincinnati, Ohio, the
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is illustrated and described, and com-
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drawing of the lapping unit are given.
The catalog also discusses the advan-
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Penflex All - Metal Galvanized Steel
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a descriptive and illustrated six-page
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Pennsylvania Flexible Metallic Tubing
Co., 72nd St. and Powers Lane, Phila-
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Wire Mill Performance Reports. A
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outlining improvements and economies
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Milliken Angle Irons, Bench and Surface Plates for use in laying out or setting up work are covered in detail in a four-page illustrated folder released by the Milliken Machine Co., 25 Prospect Pl., West Newton, Mass. Copy free upon request.

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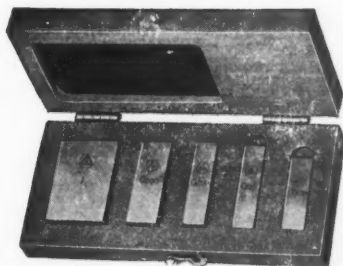
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Wis., has published a meaty, eight-page catalog on metal sawing. Although the standard line of metal cutting saws given major emphasis, other models listed include the huge hydraulic type with automatic bar-feed equipment. Recommendations are made for the correct uses of high speed steel blades of various kinds of steel, for cutting pipes, tubes, and so on. Copy free upon request.

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The American Air Filter Company announces that trade and newspaper notices of its purchases by a large electrical manufacturing company were premature. There has been no change in ownership, management or field representation of the American Air Filter Company, which will continue to function as an entirely independent organization.

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R. E. Prill, welding consultant, Practical Welding Engineering Service, 8216 Evans Ave., Chicago, Ill., has announced a service for manufacturers and fabricators of all types of metal parts and machines in which welding may be used.

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Mr. Prill's background includes experience in manufacturing on railroad, construction, pipeline, shipbuilding, car manufacturing, and general repair work, sales engineering and demonstrating, and engineering and design.

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Information and application forms may be obtained from U. S. Civil Service Examiners at any first- or second-class post office, or from the U. S. Civil Service Commission, Washington, D. C.

Portable, Motor-Driven, Gas Cutting Machine. The No. 10 Radiograph Bulletin published by Air Reduction, 60 East 42nd St., New York, N. Y., discusses in detail the lightweight, motor-driven gas cutting machine known as the No. 10 Radiograph made by this firm. The scope of the standard machine includes the cutting of straight lines, cutting circles from 3 to 85 in. diameter, cutting arcs up to a radius of $4\frac{1}{2}$ in., and irregular outlines by manual operation to a limited degree. Features of construction are outlined in detail.

The second half of the booklet is devoted to the additional practical cutting operations which can be accomplished with the No. 10 Radiograph when equipped with simple, easy-to-attach accessory equipment. With these attachments the machine is readily adaptable for plate edge preparation, for making parallel cuts—either circular or straight, for structural shape cutting—channel iron and I-beams and H-beams—and for templet cutting of oval, square, or other contours. For each of these special operations the additional equipment required for use with the No. 10 Radiograph is listed, together with manufacturers' stock numbers. Copies of bulletin are available upon request.



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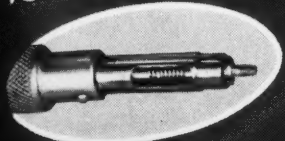
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Screw driver is lowered to Adjusto-Tray, which depresses to thrust screw head into "Pix-Up" Finder. The grip is secure, the screw perfectly aligned.

3. DRIVES!

The screw driver is brought to the work and the screw driven. One, two, three — the job's done! Assembly goes 3 to 9 times faster!



New "PIX-UP" FINDER & ADJUSTO-TRAY

New Device Picks Up Screw and Holds It for Driving

Thor has "tamed" the screw indeed! For the new Thor "Pix-Up" Finder and Adjusto-Tray, which picks up the screw *mechanically* and holds it for driving, now gives the operator *complete control* over the screw preparatory to driving. This new device eliminates entirely the operations on which human "butterfingers" waste costly seconds — picking up, starting, and guiding the screw. As a result, assembly moves along 3 to 9 times faster! For full details, send the coupon below!

Thor



Thor Portable Pneumatic Screw Drivers of the 215 type drive up to No. 8 screws. Weigh only 1½ to 2¼ lbs. Available in three throttle types.



Thor Portable Electric Screw Drivers of the U16A type drive all screws from No. 4 to No. 12. Shorter, lighter, they are truly one hand tools.

All Thor Screw Drivers can be Equipped with the New "Pix-Up" Finder Every Universal Electric, Pneumatic, and High Frequency screw driver that Thor makes can be equipped with the new "Pix-Up" Finder. It can be furnished for use with any type of screw head... on any size of screw. It is particularly adaptable, of course, for driving No. 8 screws or smaller.

INDEPENDENT PNEUMATIC TOOL CO.
600 WEST JACKSON BLVD., CHICAGO, ILL.

Birmingham
Boston
Buffalo
Cleveland
Detroit

St. Louis
Salt Lake City
San Francisco
Toronto
London

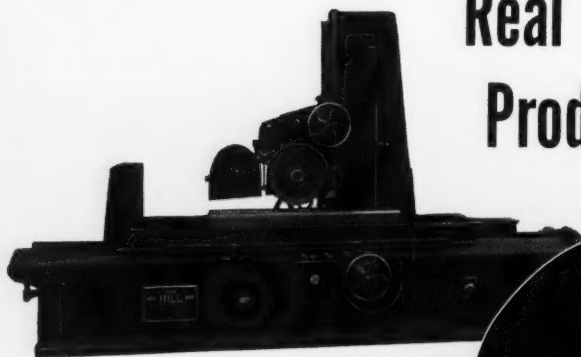
Los Angeles
Milwaukee
New York
Philadelphia
Pittsburgh

INDEPENDENT PNEUMATIC TOOL CO.
604 W. Jackson Blvd., Chicago, Ill.

☐ Please send full information on the new T "PIX-UP" FINDER AND ADJUSTO-TRAY.
☐ Please have Thor salesman demonstrate new Thor "PIX-UP" FINDER AND ADJUSTO-TRAY. No obligation.

Name _____ Title _____
Company _____
Address _____
City _____ State _____

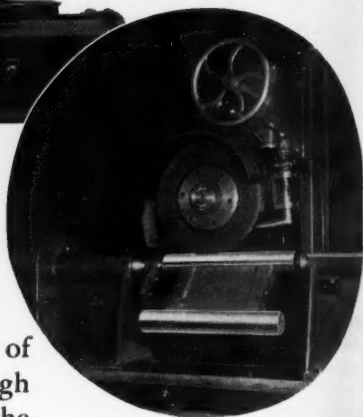
Hill Surface Grinders give Real Precision Production...



**And HILL HORIZONTAL
SPINDLE GRINDERS have
100% hydraulic cross feed**

The constant and positive flow of hydraulic power applied through two opposing pistons actuates the table on the new Hill line of Heavy Duty Surface Grinders. The result is extreme smoothness in operation which insures accuracy and increased production.

These are not meaningless statements — they are facts which you should consider carefully in selecting your next surface grinder.



75% Saving! A Hill *Open Side Horizontal Spindle Hydraulic Surface Grinder* finishing steel links. The complete grinding operation on this job now requires only 3 hours. Former machine methods took 12 hours. • Hill *Open Side Heavy Duty Hydraulic Surface Grinders* are made in a full range of sizes in both Vertical and Horizontal types. Bulletin A will be mailed to you on request.

The HILL ACME Co.

A consolidation of two nationally known, fifty year old manufacturers—
The Hill Clutch Machine & Foundry Co. . . . and The Acme Machinery Co.
6400 BREAKWATER AVE. • CLEVELAND, OHIO

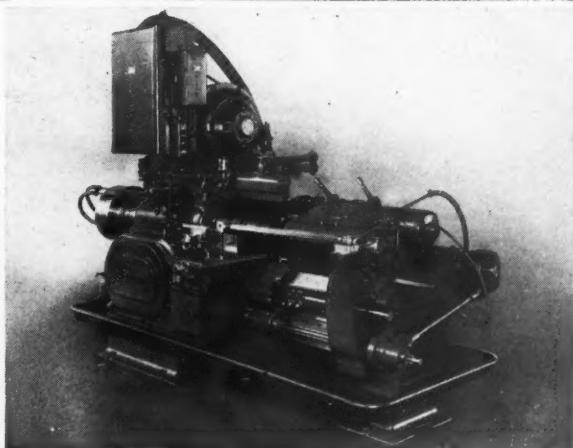
MACHINE OF THE MONTH

BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

NEW MODEL R

Lo-swing

ON AERO MOTOR
CYLINDERS



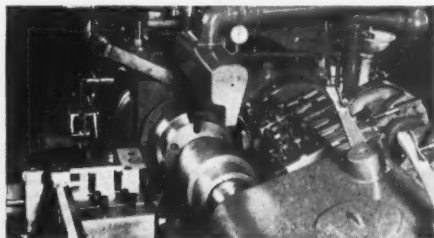
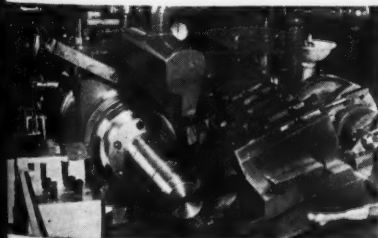
Problem: To rough turn O D, square and true both ends of aero motor cylinder forging, approximately 8" O D by 11 $\frac{1}{4}$ " long, with a 5" forged hole.

Solution: The new Model R-14 Lo-Swing was selected for this job because of its capacity, power and the rigid tool support inherent in the Lo-Swing design. The accompanying illustrations clearly show the tooling setup for this job. Four turning tools are mounted on the main carriage and five squaring tools on the back attachment. Both turning and squaring are performed simultaneously. About 35 lbs. of metal are removed in these operations.

Among the interesting features of this setup is the arbor with six expanding jaws which holds and drives the work. This arbor is fixed to the spindle nose and its outer end sup-

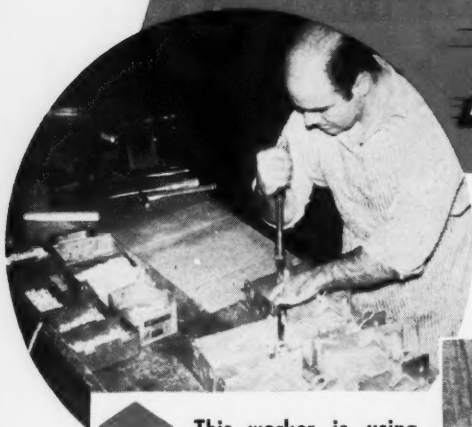
ported by the tailstock during the turning operation. In order to expedite loading and unloading of the work without excessive overhang of the tailstock spindle, the entire tailstock is moved longitudinally on the way by an electric motor drive. After the rough work is placed on the arbor, the motor drive moves the tailstock to the forward position in which it is clamped securely to the way. An air cylinder then moves the tailstock quill forward a short distance to support the arbor.

The new Model R-14 Lo-Swing illustrated is equipped with the fully mechanical Seneca Falls Quick Change-over Mechanism which makes it possible to change the stroke by merely setting a graduated dial. Easy access to this mechanism is provided through the sliding door on the carriage front.



THE NEWS from SENECA FALLS

See what you can do with **SEMS**



This worker is using SEMS Fastener Units in the manufacture of electric switches. Because the lock washer can't drop off they handle easier and faster... and no screw can be driven without a lock washer to keep it tight!



In the automotive industry, where they are used by the millions SEMS Fastener Units definitely reduce assembly costs and assure tighter, stronger fastenings.



By eliminating time formerly wasted in placing lock washer on screw SEMS Fastener Units speed up production of automatic record-changing phonographs!

SHAKE PROOF

SEMS Fastener Units ... Lock Washers
... Locking and Plain Terminals

*"Fastening
Headquarters"*

Thread-Cutting Screws ... Locking Screws
... Spring Washers ... Special Fasteners

you can save with SEMS Fastener Units!

ustry, where
ne millions
s definitely
s and assure
arnings.

NEW COST ANALYSIS CHART

... reveals actual dollars and cents savings over unassembled lock washers and screws!

Here's your opportunity to determine accurately how SEMS Units can save in your assembly work. The new Cost Analysis Chart proves conclusively that this preassembled Shakeproof Lock Washer and Screw unit will reduce your costs and, also, give better fastenings. Every metal product manufacturer should follow its simple formula to figure out his savings will be with SEMS Fastener Units.

WRITE FOR YOUR CHART!

The coupon below will bring you a free copy of this new Cost Analysis Chart. It also illustrates many other advantages of this unit which help speed up production and improve product quality. Clip the coupon now!

SHAKEPROOF LOCK WASHER CO.

Distributor of Shakeproof Products Manufactured by ILLINOIS TOOL WORKS

2517 North Keeler Avenue, Chicago, Illinois
Plants at Chicago and Elgin, Illinois

Canada: Canada Illinois Tools, Ltd., Toronto, Ontario
Copyright 1940 Illinois Tool Works



No time wasted putting lock washers on screws!



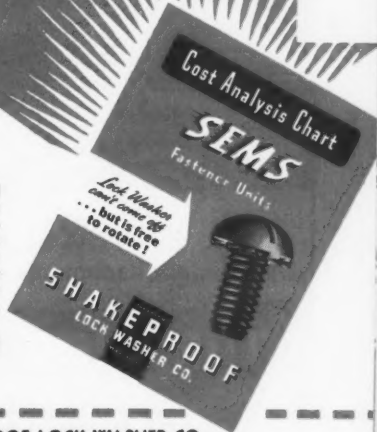
No "bottle-necks"—faster assembly assured!



No lost lock washers—so important saving!



Greater locking power—because of greater tooth contact under load!



* SEMS is the registered trade-mark of the Illinois Tool Works, manufacturers of Shakeproof Lock Washers. Only Shakeproof Lock Washers are used in the manufacture of SEMS Fastener Units.

MAIL COUPON TODAY!

*Lock Washer
can't come off*

... but is free to rotate!

SHAKEPROOF LOCK WASHER CO.
2517 No. Keeler Ave., Chicago, Ill.

Send us your new Cost Analysis Chart. We want to see what we can save by adopting SEMS Fastener Units.

Firm Name _____

Address _____

City _____

State _____

Signed by _____

Title _____

"Ohio Horizontals"

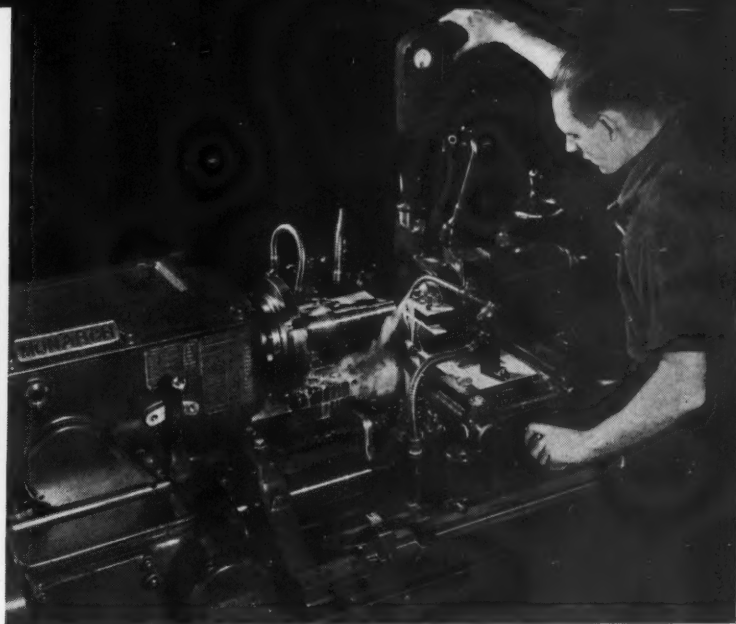
Meet the demands of modern production for power, precision and convenience --- with ability to minimize handling of work in process of production and ability to conserve valuable floor space.



Built in table and floor types with large variety of attachments and accessories. Write for bulletin.

THE OHIO MACHINE TOOL CO.
KENTON, OHIO
MANUFACTURERS OF
SHAPERS, OHIO DREADNAUGHT, PLANERS
HORIZONTAL BORING, DRILLING and MILLING MACHINES

on and
ork in
space.



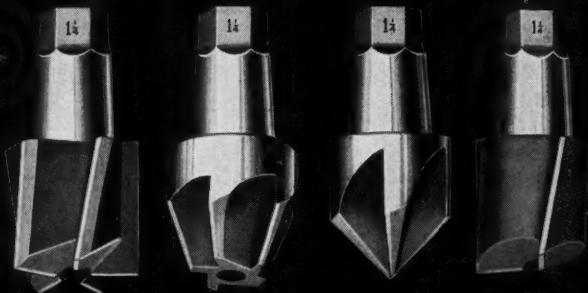
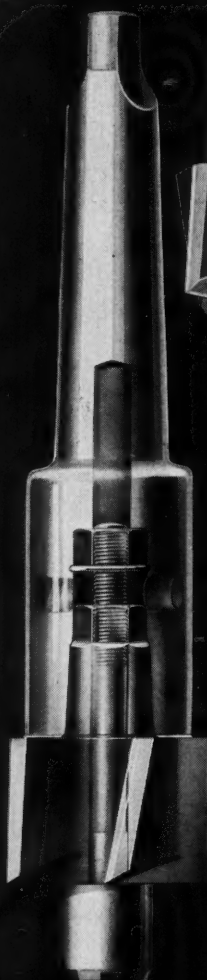
America...

KEEP YOUR BLOOD PRESSURE DOWN

WHEN hysteria holds the reins and plies the whip, we're in for a rough, hard ride. Let's be calm about this. Shouting names and pointing fingers will increase your blood pressure but it will never increase production. To speed up production, you need machines that have been planned, designed and built to meet tomorrow's high-speed requirements.

Monarch has spent years developing new lathes to anticipate industry's present and future needs. For example...the

MONARCH-KELLER *Magna-Matic* Lathe. illustrated above, is the most advanced, universal automatic lathe ever conceived. The tool "set-up" to change from one job to another is so simple and is done so quickly, that these lathes are used on small lot production. Such Monarch Lathes will help your plant meet the strain of emergency production schedules and will give you the lowest production cost on "peace-time" work after the emergency is over. The Monarch Machine Tool Co., Sidney, Ohio.



GAIRING

Counterbores

Gairing Interchangeable Counterbore Assemblies come in five sizes, taking cutters from 1-4" to 5" diameter. Holder aligns the cutter. Hexagon socket co-acts with the hexagon cutter shank -- serves as positive drive.

Cutters supplied in 3 and 5 flute forms up to 1 1-4" -- 5 flute only, above 1 1-4". Up to 3", immediate shipment -- larger sizes made up quickly.

Complete stock of standard tools -- long engineering experience -- modern production facilities -- all at your service. Use them!

The Gairing Tool Co., Detroit, Michigan
In Canada, Hi-Speed Tools Ltd., Galt, Ont.



THIS *"Out of the hat"* STEEL SERVICE WILL BRING THE BARS YOU NEED IN A HURRY!

Some day—maybe tomorrow or next week—you'll wish that you had the magic power to pull steel bars out of a hat. On that day you may need a truck load of bars to start a rush order, a few bars for any one of a dozen needs or possibly a length of shafting—but how you'll need them!

Now, don't worry about it—because there's a man not far away who can perform "out of the hat" tricks in bringing just the bars you require when you want them. He's the Union Drawn Distributor. He maintains a substantial inventory of popular sizes and shapes at all times. His steels are as fine as money can buy. And his organization is geared for high speed service.

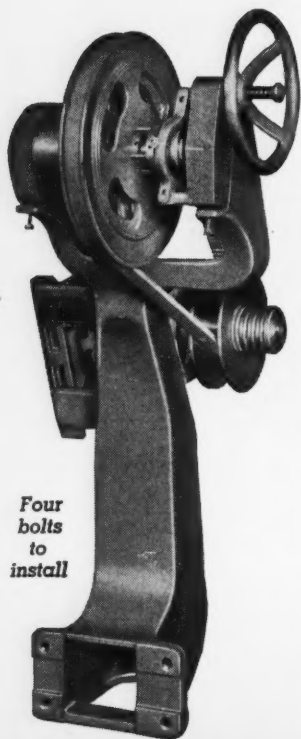
So—when that "I've got to have it" day arrives, pick up your 'phone, call your nearby Union Drawn Distributor, tell him what you need—and enjoy the satisfaction of dealing with a man whose business depends entirely upon his ability to give service.



UNION COLD FINISHED STEELS

A MOTOR DRIVE WITH INFINITELY VARIABLE R.P.M.

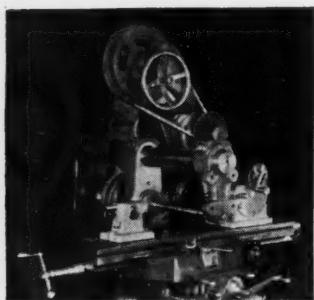
*for Lathes, Shapers,
Milling Machines, Radial Drills,
Screw Machines, Turret Lathes,
and other machine tools*



Four
bolts
to
install

THE GIVEN VARI-SPEED DRIVE provides positive, infinitely variable speeds within its ratio of 4 to 1, a greater range than that of other machine tool drives. Permits instant regulation of spindle or cutting speeds to a fraction of a revolution per minute. A large diameter single pulley eliminates all belt shifting and provides maximum power transmission. Convenient handwheel changes the speed of the driven tool while in operation. Faster and greater selectivity than gears or step cone pulleys. One piece frame. Low center of gravity. Dynamically balanced pulleys eliminate vibration. Ground belt surfaces. Ball bearings throughout. Adequate belt adjustment. Quiet. Smooth. Shockless. Safe. 1 to 5 h.p.

SEND FOR BULLETIN



Milling machine equipped with
Given Vari-Speed Drive

GIVEN VARI-SPEED DRIVE

GIVEN MACHINERY COMPANY
SANTA FE AVENUE AT MODOC
LOS ANGELES, CALIFORNIA

FOR PORTABLE SNAGGING

PLAY SAFE

WITH BAY STATE

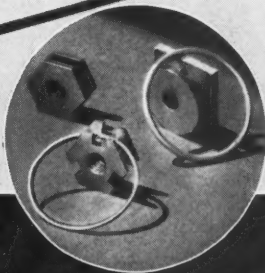
Highest quality raw materials . . .
air conditioned departments . . .
strict scientific manufacturing
processes . . . fractional grades
. . . controlled porosity . . . these
are but a few of the important
features which go into the making
of superior BAY STATE wheels
for your portable grinders, to meet
fully your most exacting require-
ments and lower your grinding
costs to a minimum.

NUT SOLIDLY IMBEDDED
WILL NOT LOOSEN

FINER ABRASIVE GRAIN
GIVES GREATER STRENGTH

$\frac{3}{16}$ " WIRE SUPPORTS NUT
STRENGTHENS THINNEST
PORTION OF CUP

Some Bay State
nuts and rings
used in Portable
Snagging wheels.



BAY STATE

ABRASIVE PRODUCTS CO.

WESTBORO, MASSACHUSETTS, U. S. A.

Another Advance in the ART of GRINDING

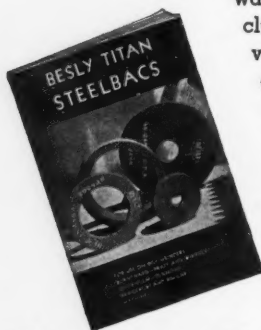
FROM THE HOUSE OF BESLY

★

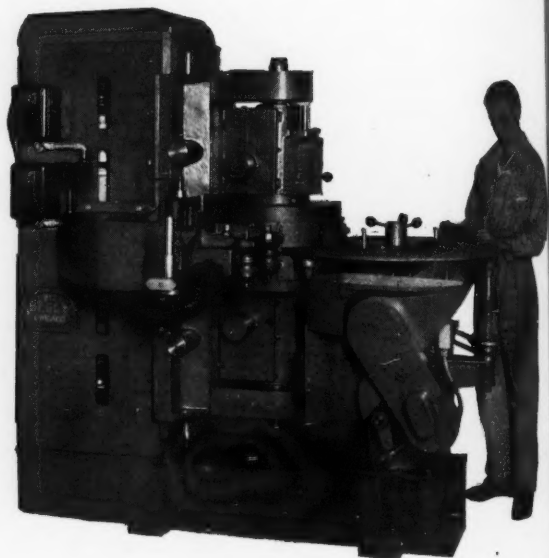
PHOTOGRAPH shows new Double Vertical Spindle Besly Grinder with Rotary Feeding. Fixture arranged for grinding coil springs. Production 1000 to 6000 springs ground per hour per operator. Heretofore unheard of accuracy as regards to length and angularity. Operator simply drops springs in holes in Feed Wheel. After passing through grinding zone springs drop out into suitable receptacle. ● These machines made to carry grinding members from 12" to 36" diameter. Always equipped with the Famous Besly Titan Steelbac Abrasive Discs, 1", 2" or 3" thick. This method of Besly Grinding lends itself to surfacing such articles as thrust

washers, piston pins, carbon discs, piston rings, wrenches, clutch facings and most jobs previously performed on the conventional Double Spindle Disc Grinder. Built also with only one head served by Rotary Fixture for grinding work with one surface to be finished. ● If you have parts that you think might be Besly ground to advantage, send us samples or prints and we will give you the benefit of our forty-five years disc grinding experience.

● Do you operate a Disc, Surface or Face Grinder employing the side of a Grinding Wheel? If so, get your copy of Booklet describing Besly Titan Steelbac Abrasive Discs. Learn about these bolted-on Discs (with one, two and three inch of Resinoid Bonded Abrasive) which continue making new records against the older type of grinding member.



**[Write for your copy
of Booklet on Besly
Titan Steelbacs.]**

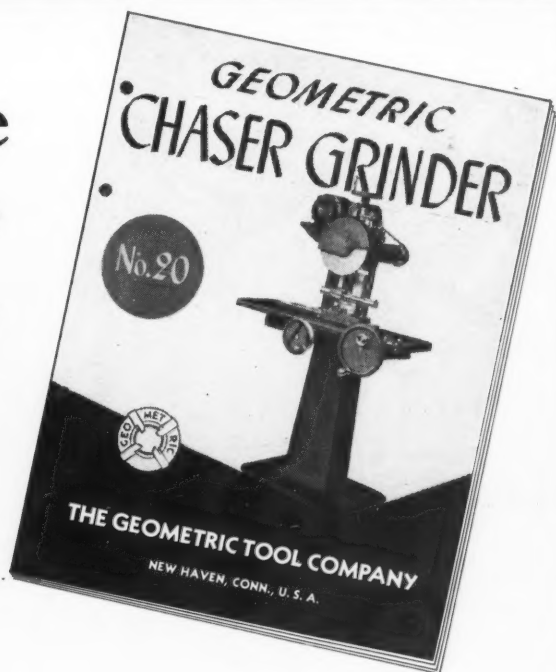


CHARLES H. BESLY AND COMPANY

118-124 NORTH CLINTON STREET ★ CHICAGO, ILLINOIS

Write
for your
Copy

New
Booklet



Make Chasers Last Longer

If you want longer Chaser life resharpen your Chasers frequently, grind them accurately, grind them uniformly.

The new No. 20 Geometric Chaser Grinder offers an economical means of doing this resharpening.

Write Dept. M for a copy of a booklet describing this new Grinder.

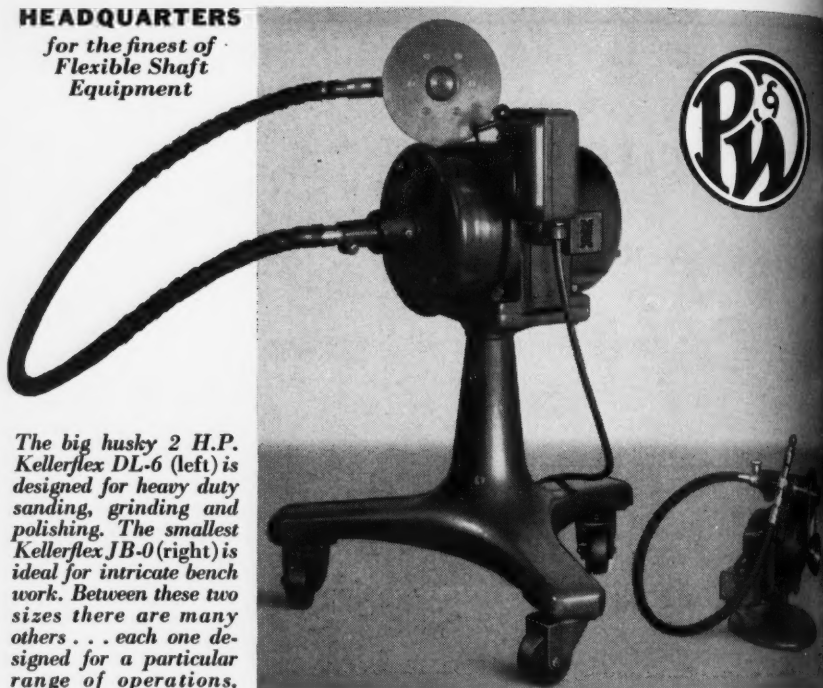
The Geometric Tool Co.

NEW HAVEN, CONN.

HEADQUARTERS

*for the finest of
Flexible Shaft
Equipment*

The big husky 2 H.P. Kellerflex DL-6 (left) is designed for heavy duty sanding, grinding and polishing. The smallest Kellerflex JB-0 (right) is ideal for intricate bench work. Between these two sizes there are many others . . . each one designed for a particular range of operations.



KELLERFLEX

Sized and Styled for the Job

In today's speeded-up production schedules each machine must be adapted perfectly to its job. Your needs in Flexible Shaft Equipment can be fitted exactly . . . there are more than thirty standard Kellerflex models, ranging from $\frac{1}{8}$ H.P. to 3 H.P. They are mounted to suit the job's requirements . . . low or standard bench stands . . . high, low or adjustable roller floor stands . . . hook or trolley suspension.

Let the Kellerflex engineer see your work . . . he will advise what machines are best suited to your particular jobs.

PRATT & WHITNEY

DIVISION NILES-BEMENT-POND CO.

• WEST HARTFORD, CONN.

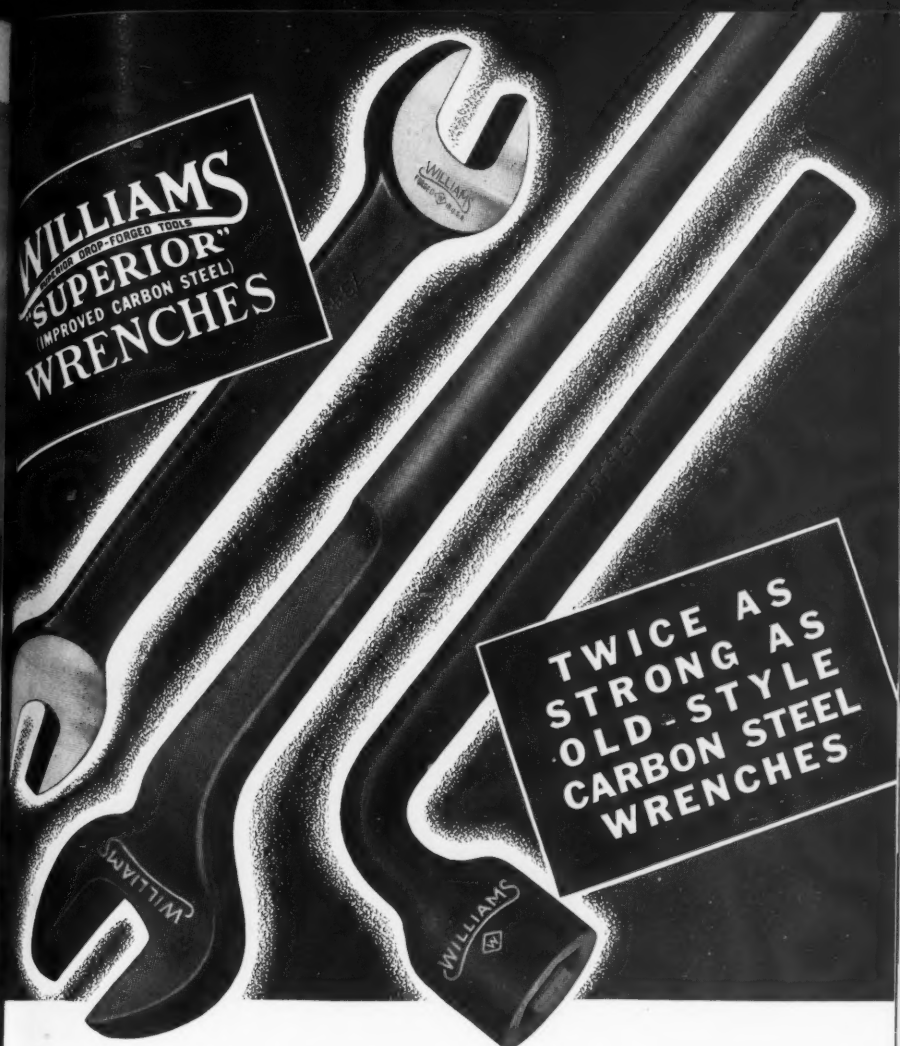
Kellerflex Sales Department



Job

EY
CONN.

er, 1940



Williams' "Superior" Wrenches are drop-forged from special-processed carbon steel. They are approximately twice as strong as old-fashioned carbon steel wrenches, yet cost no more. Exhaustive tests demonstrate that they average 93% as strong as the finest alloy steel wrenches made, selling at most double the price. "Superior" Wrenches are made in different patterns—over 1,000 standard sizes.

Sold by industrial distributors everywhere.

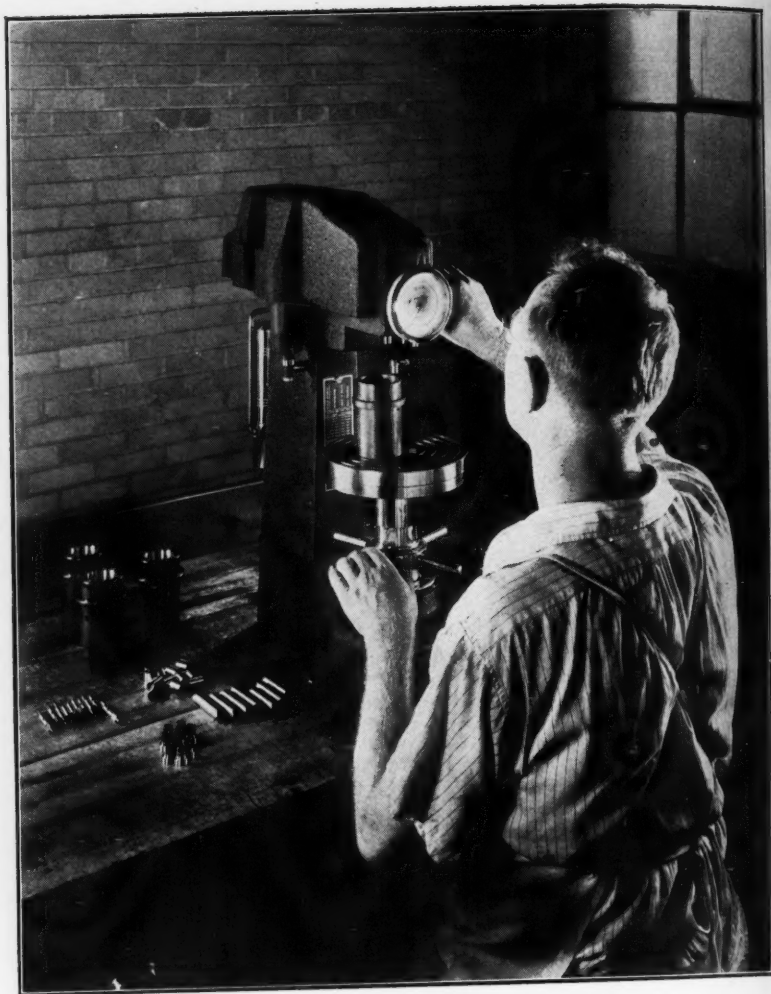
ALSO WILLIAMS' "SUPERRENCHES"

- The finest alloy steel wrenches obtainable — light, thin, strong — handsomely chrome-plated.
- Write for free booklet "How To Select and Use Wrenches," which gives you the "low down" on intelligent wrench selection.

1-6558

WILLIAMS & CO. HEADQUARTERS FOR 225 LAFAYETTE ST., NEW YORK

WRENCHES	TOOL HOLDERS	"C" CLAMPS	LATHE DOGS	PIPE VISES	PIPE TONGS	THUMB NUTS & SCREWS	HOIST HOOKS	EYE BOLTS



Here is a case where the doctor *does* take his own medicine. We, of course, use a "ROCKWELL" Hardness Tester for testing our own parts.

"ROCKWELL" HARDNESS TESTER



Called in the Draft— **...THIS GISHOLT TURRET LATHE!**

There are times when the good of all calls for sacrifice from a few. And it concerns not only men, but the machines which are so urgently needed to produce the essentials of our national defense.

Like other machine tool builders, have been asked to divert machines in certain cases. We don't disappoint any good friend and customer. But when America's defense takes first call, Gisholt machines are sometimes "drafted" into service where they are most vitally needed.

We commend the loyal attitude of those who sacrifice their own plans that the national program might proceed more swiftly. And we are doing everything within our power—working night and day—straining every resource—to build as many Gisholts as possible, as quickly as possible.

GISHOLT MACHINE COMPANY

1219 East Washington Avenue
 Madison • Wisconsin

Keep ahead—keep ahead—with Gisholt improvements in metal turning



ST LATHE • AUTOMATIC LATHE • BALANCING MACHINES

WITH FEATURES SUCH AS HYD



THE CINCINNATI MILLING MACHINE CO



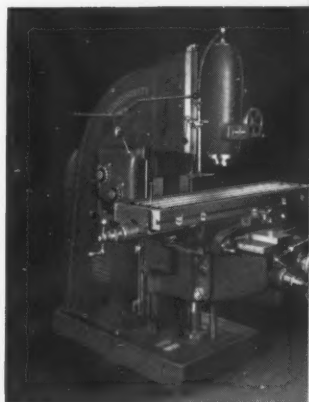
H A HYDRAULIC CLUTCH ENGAGEMENT

YOU KNOW THE MACHINE IS EASY TO MANIPULATE

When a machine tool manufacturer goes to the trouble of building his machine with a hydraulic clutch engagement and spindle brake device—just for the fellows who start and stop many times a day—you can feel sure that all the manipulating controls are easy to handle. You'll find hydraulic clutch engagement, and many other features of easy operation, on CINCINNATI Dial Type Milling Machines. That's why milling machine operators everywhere prefer the Dial Types. They're easier and more convenient to operate, allowing the man to use practically all his thought and energy in completing the milling operation at hand.

Of course, there are other features of easy, safe, and convenient operation. Single lever power speed and feed changes at front and rear working positions . . . lever type saddle clamp and knee clamp (no wrench required) . . . pull-out quick adjustable micrometer dials. Nineteen profitable features are illustrated and described in catalog M-868. Write for your copy today.

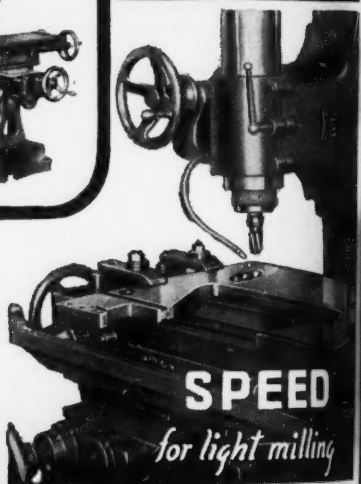
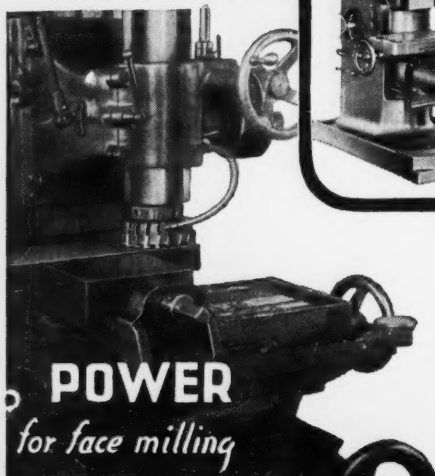
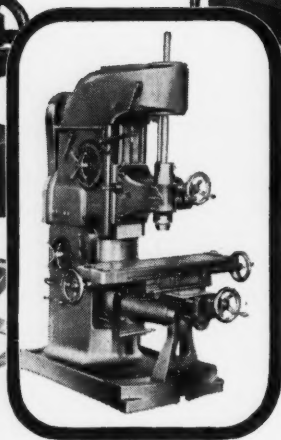
Universal machine shown at the left, vertical machine at the right. There are high speed and medium speed machines, three styles of each (plain, universal, and vertical) and three sizes of each (Nos. 2, 3, and 4).



CO

CINCINNATI • OHIO • U.S.A.

The KNIGHT MILLER Handles a Wide Range of Work in Minimum Set-up Time



W. B. KNIGHT MACHINERY CO.

• ST. LOUIS, MISSOURI •

Vide
ime

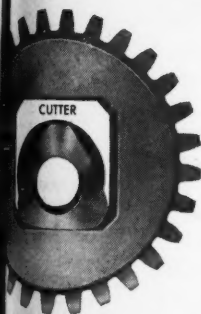
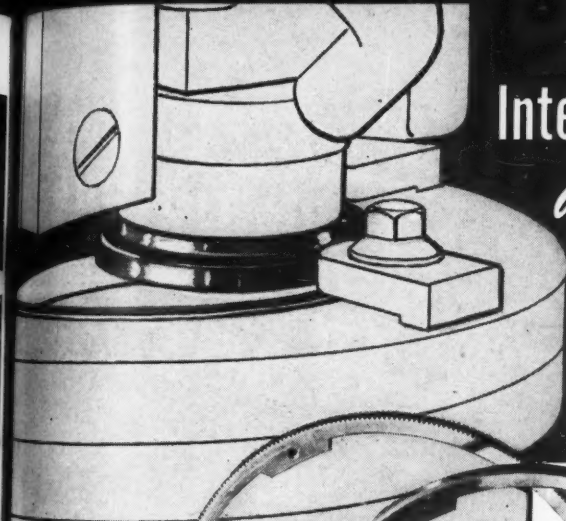
CY
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or, 1940

Internal Profiles *a Natural* for the GEAR SHAPER



Cutters can be made to produce practically any shape, from a simple internal key as illustrated above, to irregular, serrated or other internal contours. A further advantage of the Gear Shaper is that in many instances the mating external profile can be produced with the same cutter — also any fit can be obtained. For a glimpse of the wide range of Gear Shaper usefulness, write for "The Fellows Method"— 64 pages of informative text and illustrations. Please use your business stationery.

THE **FELLOWS** GEAR SHAPER
COMPANY

Springfield, Vermont — 640 West Town Office Building, Chicago, Illinois — 616 Fisher Building, Detroit, Mich.

Step up production

ALL ALONG THE LINE with

Hanna Cylinders

**STANDARD MODELS
for SPECIAL JOBS!**



Left: Hanna Hydraulic Cylinder Model H. P. 17, one of ten standard models built to accommodate practically every type of mounting requirement.



Above: Hanna Hydraulic Cylinder Model H. P. 14, arranged for pivot-mounting, permitting cylinder to swing in an arc.

Right: Hanna Model 18 Low Pressure Cylinder, designed to operate with air, oil, or water, at pressures up to 100 lbs. per sq. in. This model is equipped with a flat base for rigid mounting.



Below: Hanna Model 4 Air Cylinder with mounting for horizontal or vertical power movement.



IF YOUR present production schedule calls for increased speed, more work per man, and greater efficiency from existing machinery, then put Hanna Cylinders on the job right now! Let these efficient units do the hundreds of jobs that now require sheer physical effort or that now depend upon obsolete methods. There is a complete line of standard Hanna Cylinder models ready to handle special jobs that call for pushing — pulling — raising or lowering, faster and more economically.

We are equipped to meet your cylinder requirements promptly. Hanna Cylinder Catalogs, No. 229 Hydraulic and No. 228 Pneumatic, give complete details. Send for them today.

HANNA ENGINEERING WORKS

1772 ELSTON AVENUE

CHICAGO, ILLINOIS

Air and Hydraulic
RIVETERS

Air and Hydraulic
CYLINDERS
Air HOISTS

Reamer Life DOUBLED!

Finish—better than before



IN REAMING steering knuckle arms on 3-spindle Baker Drill Press, roughing reamer life has been increased from 100 to 200 pieces. Finish reamer life to 277 pieces. The finish is better than before.

These improvements have resulted solely from changing over to **TEXACO SULTEX CUTTING OIL B**.

Getting down between the work and the tool, *Texaco Sultex* cools by reducing friction, thus preventing the chips from welding to the tool and spoiling the finish. Tools stay sharp, cool, smooth-cutting.

Our cutting oil engineers will gladly cooperate in making savings with *Texaco Sultex Cutting Oils* and *Texaco Soluble Oils* in your plant. Phone the nearest of more than 2300 Texaco warehousing points in the 48 States, or write:

The Texas Company, 135 E. 42nd St., New York, N. Y.

TEXACO DEALERS INVITE YOU TO ENJOY



FRED ALLEN in a full-hour program every Wednesday night. CBS, 9:00 E.S.T., 8:00 C.S.T., 10:00 M.S.T., 9:00 P.S.T.



METROPOLITAN OPERA every Saturday afternoon. NBC. See local newspaper for time and station.

FRONT AXLE Steering Knuckle upper arm rough reamed at a 100% saving in tool life . . . thanks to *Texaco Sultex Cutting Oil*.



TEXACO SULTEX CUTTING OILS SOLUBLE OILS

KNURLED



**Unique "UNBRAKO"
refinements
that help
you to do a
better job**



Reg. U. S. Pat. Off.

... A BETTER JOB with "Unbrako" Cap Screws because the cold-forged knurled heads gear right to the fingers and prevent annoying finger slip. They turn faster and farther before applying wrench or pliers, hence speed up assembly. Finished appearance is neater on any product.

... A BETTER JOB with "Unbrako" Self-Locking Hollow Set Screws because their knurled points insure a vibration-defying grip. Set them up with no more than average pressure and they **HOLD TIGHT!** Save maintenance costs . . . prevent costly trouble. Yet "Unbrako" Self-Lockers are easily applied or removed and can be used over and over again.

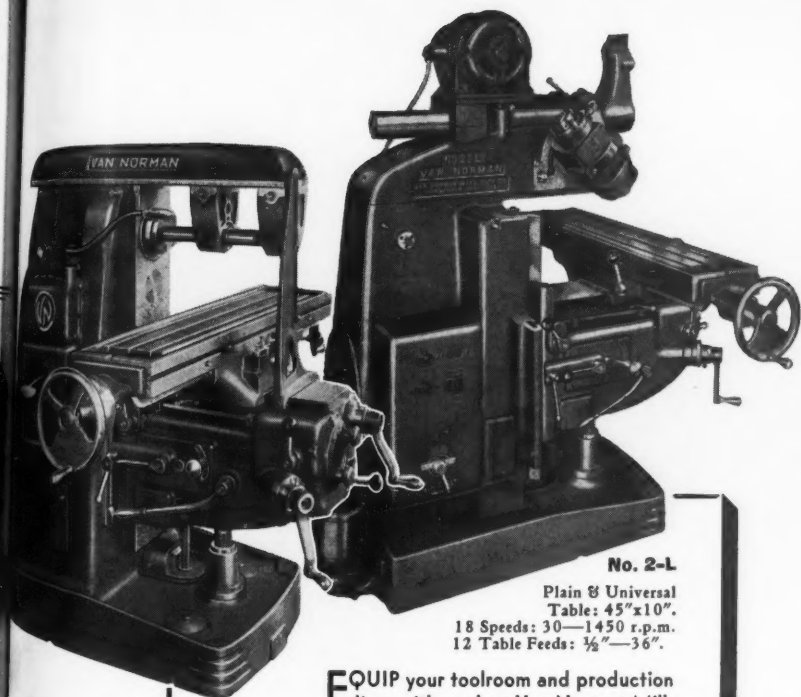
Get complete information now. Ask your distributor, or write—

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA. BOX 556

— BRANCHES —

BOSTON • DETROIT • INDIANAPOLIS • CHICAGO • ST. LOUIS • SAN FRANCISCO



No. 2-L

Plain & Universal

Table: 45"x10".

18 Speeds: 30—1450 r.p.m.

12 Table Feeds: 1/8"—36".

No. 22-L

Plain & Universal

Table: 45"x10".

Range: 26" longitudinal,

11" cross. 16" vertical.

EQUIP your toolroom and production lines with modern Van Norman Millers that provide new ease of set-up and control . . . smoothness in operation on the heaviest cuts . . . and plenty of weight and power to keep on turning out work of the highest accuracy under the most strenuous schedules that today's conditions impose.

Van Norman's complete line includes Ram Type Universal Millers . . . and two types of Horizontal Millers (both plain and universal). From this line, you can obtain the machines best suited to your particular needs, for increasing output and quality on any class of work from the heaviest to the most sensitive. Write for detailed, illustrated bulletins.



VAN NORMAN MACHINE TOOL CO.
SPRINGFIELD, MASS.

APEX

POWER BITS
for
Phillips and Slotted Screws



HAND DRIVERS
General Purpose and Super
Service for Phillips Screws

You don't have to ask for greater production--

If you give your men APEX Power Bits and Drivers for Phillips, Slotted Head and Clutch Head screws, because—

All men like to work with good tools—tools of good quality, that enable men to take some pride in their ability to do their job well.

APEX Tools are good tools.

They are made of the most suitable steel obtainable—are accurately machined, carefully heat-treated. Our men use good tools and materials to give your men good tools to work with.

And, when your men have such tools, they just naturally can't help but turn out more work in a given time. There is less wear, less breakage, fewer stops for tool changes, and less mental strain, fearful of failure at a crucial moment.

You know the pride you take in good tools—your men have that same pride. Let them enjoy it—give them good tools—give them APEX.

The APEX MACHINE & TOOL Co.
Dayton, Ohio

50% Less Axial Clearance with the **NEW MANGER FLEXIBLE COUPLING**

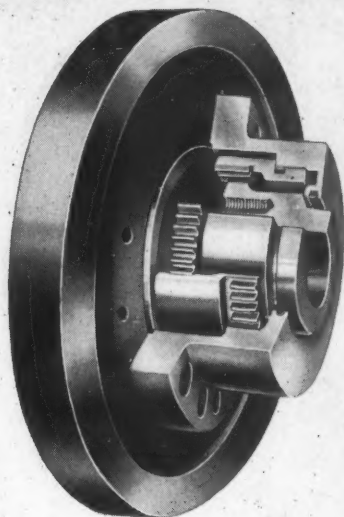
Reduction of the axial clearance by one half, as well as elimination of dummy, pilot or stub shaft usually required with other types of couplings in connecting a shaft directly to a flywheel, brake drum or flange, are both achieved by the new Manger Flexible Coupling.

This new coupling is equally applicable for connecting two free-ended shafts in combination with a solid, flanged, half coupling and effects a remarkably close-coupled connection. And in connecting shafts of different diameters the flexible member is determined by the size of the smaller shaft, making possible the use of a smaller and lower priced coupling.

In addition to all ordinary applications for flexible couplings the Manger Coupling is also easily and advantageously used in many special applications.

DESIGN and CONSTRUCTION

In the Manger Coupling compensation



Cutaway view showing Manger Coupling bolted to an engine flywheel.

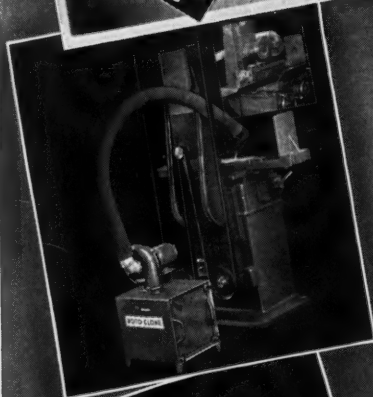
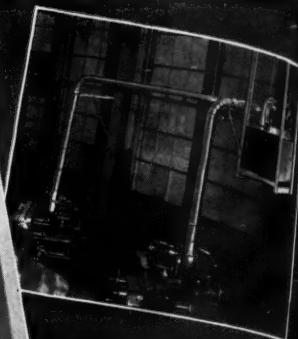
for misalignment is made by an internal sleeve which floats between an externally geared hub and an internally geared covering sleeve. The internal sleeve, which engages the hub and outer sleeve is free to slide and rock, adjusting perfectly for differences in alignment. The coupling provides for offset, angular and combined misalignment without resistance to free lateral float of the connected shafts.

Our bulletin No. 443, "Farrel Gearflex Couplings," gives complete details of the design and construction of the Manger Couplings, as well as particulars regarding various applications. A copy will be sent promptly on request, without obligation.



FARREL-BIRMINGHAM COMPANY, Inc.
381 VULCAN STREET - - - - - BUFFALO, N. Y.

The Gear with a Backbone



A SIMPLE SOLUTION FOR *Localized* DUST PROBLEMS

Self-contained Roto-Clone units are designed to exhaust single or small groups of light grinding or polishing operations. Due to its compactness the Roto-Clone becomes an integral part of the equipment exhausted. Cleaned air from the Roto-Clone discharge is passed through a viscous impingement, washable type filter for final cleaning before it is returned to the work room. Send for complete information and engineering data.

AMERICAN AIR FILTER CO., INC.
698 Central Avenue
LOUISVILLE, KENTUCKY

Write for
Bulletin
No. 275A.

ROTO- CLONE

SELF CONTAINED UNITS

JARVIS

FLEXIBLE SHAFT POWER DRIVEN MACHINERY

Increased production — better finishes
minimum cost and nominal installation
expense, Jarvis-built Biax Tools prove their
versatility for grinding, drum and disc
grinding, snagging, filing, wire brushing,
polishing and cleaning operations
on all metals and compositions.

*Write today for catalog—
Learn how to save.*

the CHAS. L. JARVIS Co.

MIDDLETOWN

CHICAGO OFFICE AND STOCK

CONNECTICUT

1344 W. WASHINGTON BLVD.



LANDIS SHARPENED CUTTING TOOLS

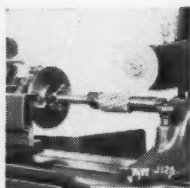
help insure peak production



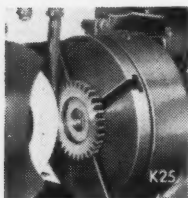
It is not news to make the statement that peak production is the demand everywhere these days. How to meet the demand successfully is, as it always has been, a problem which can be simplified by the use of properly sharpened cutting tools.

The Landis 12" x 28" Universal and Tool Grinder deserves your special attention for this reason. Its myriad of possible uses plus its unusual capacity and weight make it an ideal machine for most tool room operations.

Catalog No. K-40 will quickly convince you.

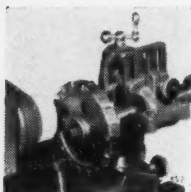


Above: HOB grinding by the use of the hob grinding attachment.

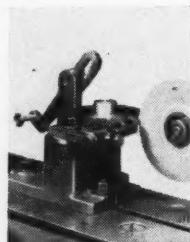


Above: FELLOWS GEAR SHAPER CUTTER being face ground.

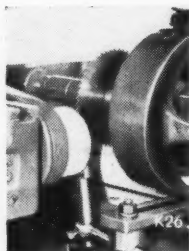
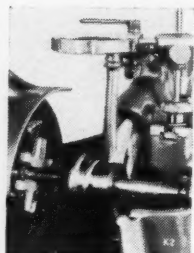
Below: FACE MILL held in the universal head for the grinding of the side of the teeth.



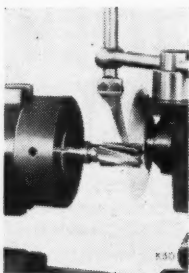
Below: GEAR CUTTER teeth being ground with the aid of the gear cutter grinding attachment. Staggered tooth gear cutters may also be ground on an attachment made for that purpose.



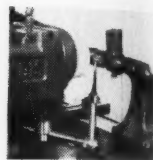
Below: CIRCULAR FORMING TOOL being ground on the Landis 12" x 28". Equipped for work of this kind the machine is widely and most successfully used to grind the contours of numerous screw machine forming tools.



Above: Grinding the teeth of a SAW. The face of the saw may also be handled by the same equipment.

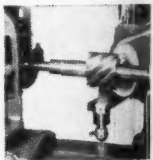


Above: Grinding an END MILL with the aid of the end mill grinding attachment. Those not having a large number of end mills to grind would not require an attachment for the purpose.

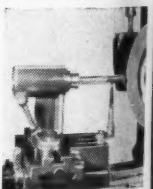


Above: Backing off a REAMER and using the left hand footstock.

Below: A SPIRAL MILL being ground with the aid of the universal head.



Below: Grinding the radius on the end of an END MILL. This requires a radial grinding attachment which may be used in other parts such as radial cutters.



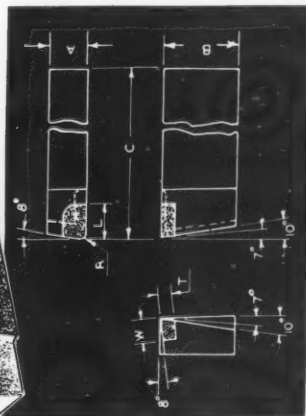
LANDIS TOOL COMPANY — WAYNESBORO, PA.

Prices Reduced on WESSON Standard Cemented Carbide Tools!

Drastic price reductions have been made possible by WESSON'S increased production and the lowered cost of Carbonyl metal. Now you can have all the advantages of carbide tools on EVERY job! The tools listed here (5 styles, 3 grades) cover 80% of all carbide tool requirements—two for cast iron, one for steel. All tools are ground ready for use. Steel-cutting tools include ground-in chip breaker.

Steel-cutting tools are copper-color; all others are aluminum-color.

Order NOW and avoid delay: give tool number, quantity, and grade of Carbonyl desired. Wesson STANDARD Tools are furnished in the following grades of Carbonyl: **Grade 78-B:** for general machining of steel. **Grade 44-A:** for general purpose machining of cast iron, brass, non-metallics, etc. **Grade 883:** a harder, more wear resistant grade than 44-A, but having less resistance to shock and vibration.



Style T-4 (Right Hand as shown)
Style T-7 (Left Hand)

Tool Order Number		Shank Size		Carbonyl Blank Number		Price each in the following quantities.					
Right Hand	Left Hand	A	B	C	Right Hand	Left Hand	1	2-4	5-9	10-24	25-49
T-42	T-72	5/16	5/16	2-1/4	R-211B	R-211B	1.55	1.30	1.15	1.00	.90
T-43	T-73	3/8	3/8	2-1/2	R-212B	R-212B	1.85	1.50	1.30	1.15	1.00
T-45	T-75	1/2	1/2	3-1/2	R-222B	R-222B	2.65	2.15	1.85	1.70	1.50
T-47	T-77	5/8	5/8	4	R-223A	R-223A	3.95	3.20	2.75	2.50	2.40
T-48	T-78	3/4	3/4	4-1/2	R-237A-BH	R-237A-LH	5.35	4.25	3.65	3.35	3.10
T-406	T-706	1	1	6	R-247-BH	R-247-LH	9.55	7.60	6.50	5.95	5.95
T-410	T-710	1-1/4	1-1/4	6	R-258-BH	R-258-LH	15.50	13.30	10.40	9.90	9.90
T-403	T-703	5/8	1-1/4	7	R-252A-BH	R-252A-LH	9.45	7.60	6.55	6.05	6.05
T-404	T-704	3/4	1-1/2	7	R-263A-BH	R-263A-LH	12.20	9.75	8.35	7.65	7.65

Swings into any desired position --and stays put

The accompanying photographs suggest the amazing flexibility of the Dazor Floating Lamp by illustrating a few of the countless positions obtainable. It may be raised, lowered, pushed, pulled, swung completely around by a mere finger's touch -- and stays rigid at the exact angle placed. WITHOUT ADJUSTMENT OR LOCKING, the arms being scientifically counter-balanced by a spring.

Dazor Floating Lamps mean correct localized lighting, with no glare, no eyestrain. They soon pay for themselves in greater efficiency.

Five types of bases available for clamping or screwing to lathes, drills, presses, shapers, milling machines, benches, drafting boards, desks, walls, business-machine stands. Also portable pedestal type.

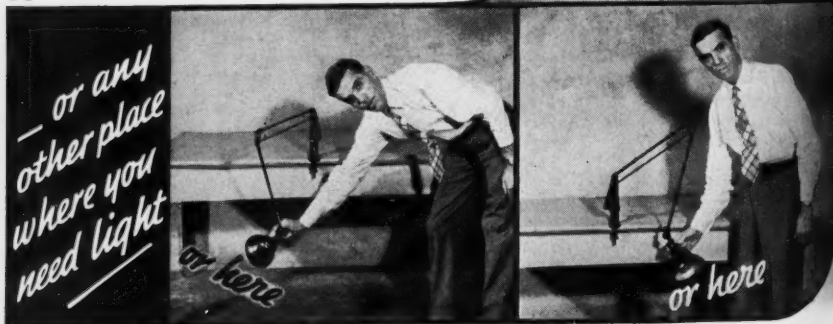
Distributed by appointed electrical wholesalers. Call your supplier or write us for distributor's name and descriptive literature.

DAZOR MANUFACTURING CORP.
4483 DUNCAN AVE. ST. LOUIS, MO.

Dazor Floating Lamps

Fluorescent and Incandescent

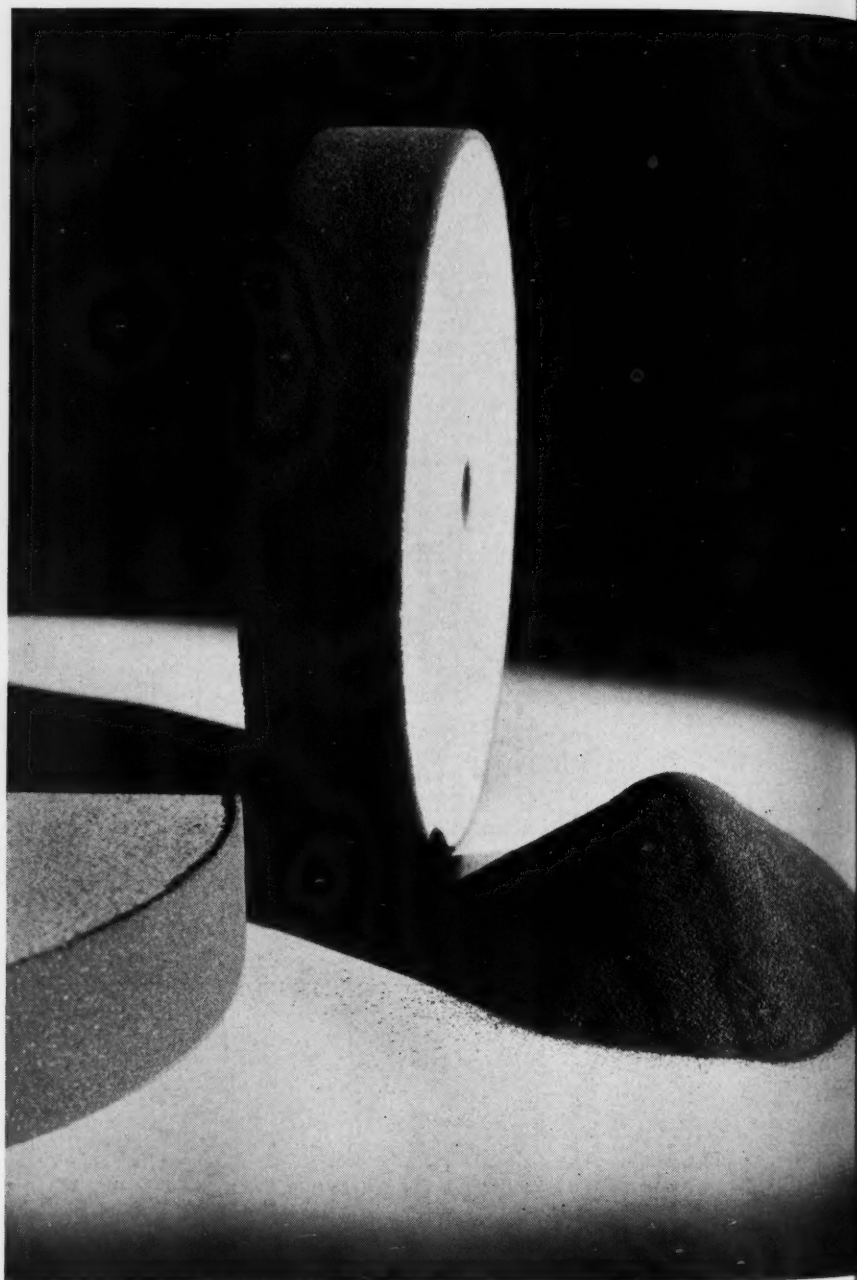
Y-3

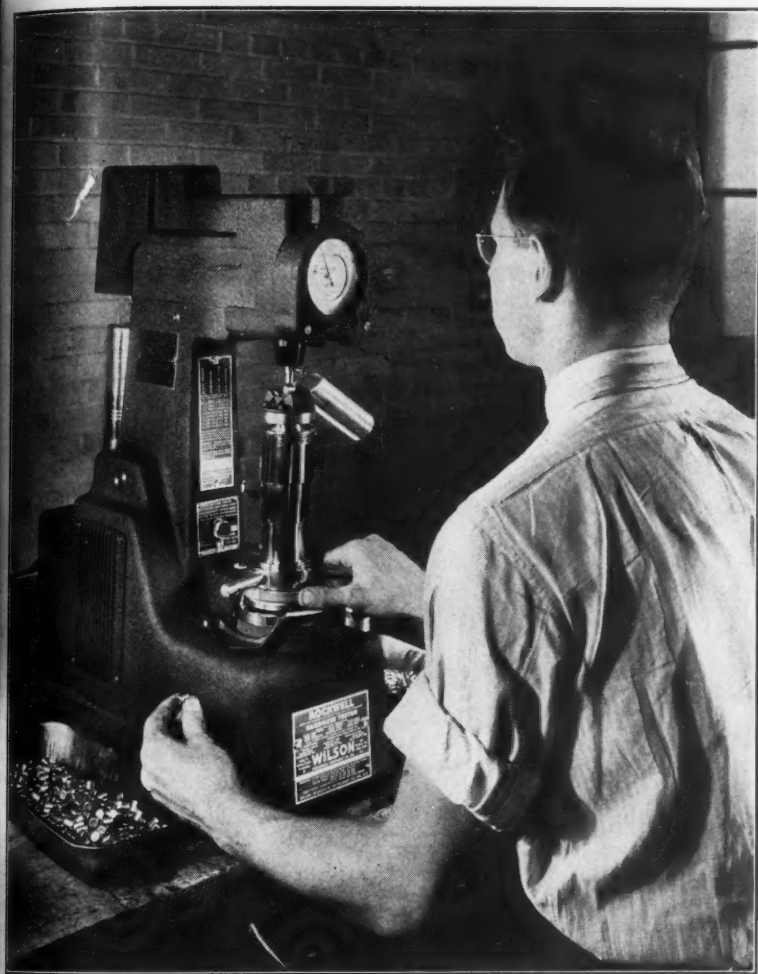


December, 1940

MODERN MACHINE SHOP 125

Model	Price	Weight	Height	Width	Depth	Material	Finish	Color	Notes
Y-3	10-24	1	1	1	1	1	1	1	1
Y-4	10-24	1	1	1	1	1	1	1	1
Y-5	10-24	1	1	1	1	1	1	1	1
Y-6	10-24	1	1	1	1	1	1	1	1
Y-7	10-24	1	1	1	1	1	1	1	1
Y-8	10-24	1	1	1	1	1	1	1	1
Y-9	10-24	1	1	1	1	1	1	1	1
Y-10	10-24	1	1	1	1	1	1	1	1
Y-11	10-24	1	1	1	1	1	1	1	1
Y-12	10-24	1	1	1	1	1	1	1	1
Y-13	10-24	1	1	1	1	1	1	1	1
Y-14	10-24	1	1	1	1	1	1	1	1
Y-15	10-24	1	1	1	1	1	1	1	1
Y-16	10-24	1	1	1	1	1	1	1	1
Y-17	10-24	1	1	1	1	1	1	1	1
Y-18	10-24	1	1	1	1	1	1	1	1
Y-19	10-24	1	1	1	1	1	1	1	1
Y-20	10-24	1	1	1	1	1	1	1	1





Here, before shipment, we are test-
ing the operation of one of our
Motorized Machines destined for
quantity inspection testing.

WILSON

MECHANICAL INSTRUMENT CO., INC.
Concord Ave. and 143rd St., New York, N. Y.

MODERN MACHINE SHOP 37



SPECIFICATIONS:

Number of Press... 7B36 • Stroke... 10"
Capacity... 215 tons • Die Space... 24"
Slide area 24"x30" • Bed area 39"x36"
Type of gearing, Double • Strokes per
min., 20 • Type of clutch and brake,
Verson Pneumatic • Type of clutch con-
trol, Electric Push Button.

Equipped with Verson Counterbalancing Cylin-
ders and Verson Pneumatic Die cushions.

Verson Presses are available in capacities up to
5000 tons.

A Verson PRESS—

**Built for the
Deep Drawing
and Stamping
Problems of
Today!**

HERE'S a straight side mechanical press of 215 tons capacity that is ideal for the tough production schedules of industry's increasing pace. It is a typical example of the efficiency in design found in all Verson products.

Versatility, increased punch and die life, exceptionally clean stampings are inherent features of Verson Presses for they are built by the pioneers of welded allsteel frames.

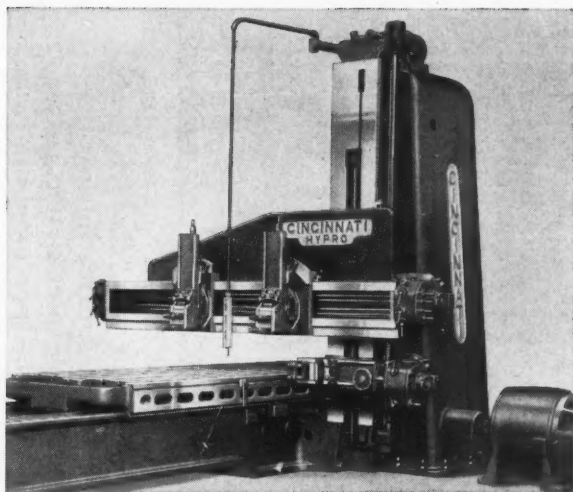
Whether you manufacture generator rotor laminations or one-piece turret tops—there is a Verson Press to do your job efficiently, quickly and at minimum cost.

Let a Verson engineer help you choose the press you need.

VERSON ALLSTEEL PRESS COMPANY

9310 South Kenwood Avenue
CHICAGO • ILLINOIS

Power Presses • Press Brakes
Hydraulic Presses • Clutches
Forging Presses • Die Cushions



ANOTHER CINCINNATI PLANNER FOR HYPRO-DUCTION

This time a 72" Openside Planer.

Many features prove this Planer as a HYPRO-duction machine.

Frequently excellent use is made of Auxiliary Convertible Column and fourth Head on left side of the Planer. Left Side Head is equipped with separate feed and rapid traverse mechanism.

Drive is completely constructed of steel herringbone gears mounted on large diameter hardened shafts.

Double bronze Nuts are used on all saddles

and down feed screws, thereby assuring double life and greater accuracy.

Renewable steel tee Inserts in Table Slots provide longer life for Planer Tables.

Selective Magnetic Dial Feeds insure quick and accurate movement of the heads under all conditions.

Cut and return table speed of 8 to 240' per minute are provided plus a great increase in number of strokes per minute.

Operator controls entire Planer by central Pendant Station from either side of machine.

ALL OF THESE FEATURES AND MANY OTHERS MAKE ANOTHER CINCINNATI PLANNER WHICH MEANS ANOTHER HYPRO-DUCTION MACHINE FOR A SATISFIED CUSTOMER AND OPERATOR.

Write for bulletin No. 110 which illustrates and describes our Openside Planers in detail.

The CINCINNATI PLANNER Co.

CINCINNATI

OHIO, U. S. A.

PLANERS • PLANNER MILLERS • VERTICAL BORING MILLS

December, 1940

MODERN MACHINE SHOP 39

CUTTER ~~Life Begins at...~~

with **SUNOCO**
EMULSIFYING
CUTTING OIL

Now's the time Sunoco Emulsifying Cutting Oil can really do a job for you. Its high heat absorbing and excellent lubricating properties make possible more pieces per cutter grind . . . reduced rejects per machine . . . and the maintenance of accuracy and fine finish. That's why leading machine tool manufacturers choose . . . use . . . and recommend Sunoco Emulsifying Cutting Oil.

performance data . . . facts . . . and figures on

PERFORMANCE DATA
Piston and Slideway
Machine Shaft for

Manufacturers choose . . . use . . . and recommend
Sunoco Emulsifying Cutting Oil.

performance data . . .
facts . . . and figures on
rated capacity runs on the
most modern machine
tools. Write for your
copy NOW.

SUN OIL COMPANY
PHILADELPHIA

PERFORMANCE DATA
Given and mill-dollars variance of
machine
Machine—Cincinnati 0.2 Plain
Automatic Milling Machine
Material—S.A.E. 1025 Steel
Feed— $7\frac{1}{2}$ inches per minute
Cutting Speed—332 R.P.M.
Sunoco to 20 parts water

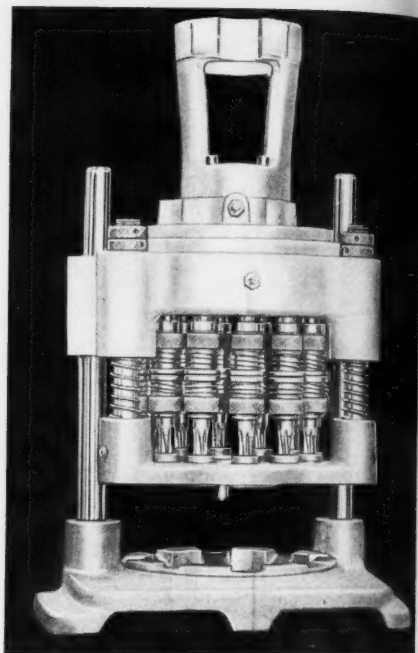
Courtesy of
**THE CINCINNATI MILLING
MACHINE COMPANY**



PETROLEUM PRODUCTS FOR ALL INDUSTRIES

A New Thought **IN THE APPLICATION OF SMALL MULTIPLES**

Reaming and Spot Facing



Bushing plate makes the fixtures very simple.
Full floating chucks are provided.
Chucks are provided with end adjustment for different length reamers.
Because of engineering, the holes will be more accurate and consistent.
Bushing plate is provided to support the reamer at the very tip until it enters the work.
Capacity up to $\frac{3}{4}$ ".
Let us look over your job and submit our recommendations . . . No obligation.

ETTCO TOOL CO.

**596 JOHNSON AVE.,
DETROIT**

CINCINNATI

**BROOKLYN, N. Y.
CHICAGO**

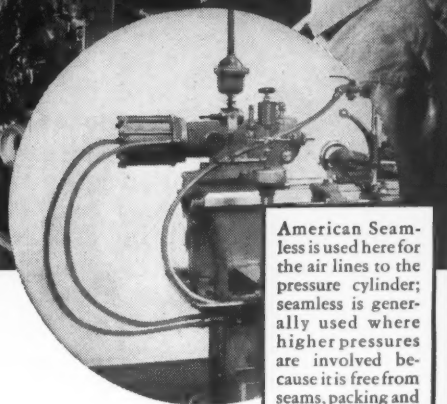
Hydraulic and Coolant Lines

For large turret
the is equipped
with coolant lines
sturdy, depend-
able American
Metal Hose. Quick
installation and
easy flexing make
it the choice of
machine tool
makers.

space and installation costs with flexible American Metal Hose

Today when machine tool makers use any-
where flexible metal coolant lines for carrying
oils and coolants from reservoir to work—
there's a good reason why this practice has be-
come standardized. First of all, American's Cool-
ant Hose is extra flexible, yet, because of its
construction it is easily and quickly adjust-
ed from one position to another . . . and best of
all, it stays in position directing the flow accurately
to the exact spot on the work.

Hydraulic and air driven mechanisms on ma-



American Seam-
less is used here for
the air lines to the
pressure cylinder;
seamless is gener-
ally used where
higher pressures
are involved be-
cause it is free from
seams, packing and
joints of any kind.

chine tools, you can't go wrong on American
Flexible Metal Hose and Tubing for conveying the
actuating medium. American Seamless—made from
seamless tubes that are corrugated for flexibility and
wire braided for strength—has proved that it's safe
for carrying oil, air—in fact practically all liquids
and gases—under pressure. Full details are available
in our Catalog D-25. Ask for your copy. 40271-A

American Metal Hose



The American Metal Hose Branch of The American Brass Company
General Offices: Waterbury, Conn. *Subsidiary of Anaconda Copper Mining Company*
In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

Better Hardening!

PERFECTION TOOL & METAL HEAT TREATING CO.
1740-46 WEST HUBBARD STREET
Phones Haymarket 2024-5-6
CHICAGO, ILL.

December, 1940

Mr. Manufacturer:

Good tools, and many production parts, deserve good hardening. Our job is helping firms like yours to improve quality and results.

More than two thousand plants, in many States, are finding our service pays.

Did you ever stop to reason why?

Well, just remember that to stay in business and grow, we must constantly:

1. Do better hardening than the firms we serve are equipped to do for themselves, or do it at less cost--frequently both.
2. Solve difficult heat treating problems --turn headaches into profits.

For nearly a quarter-century, we have been doing these very things. The volume has increased more than ten times in the past ten years. What better proof could be offered?

Honestly, don't you think such a wealth of experience, coupled with about \$250,000 worth of modern equipment, half a hundred skilled men, all under expert supervision, might help us to do your tools or product some real good?

Yours very truly,

John Hulting
President

JH/E

FOR 23 YEARS WE HAVE SPECIALIZED ON DIES, TOOLS AND MOLDS

Better Results!

A New Way to Harden High Speed Steel — makes it harder, all through — and twice as tough. Ask for details!

PERFECTION TOOL & METAL HEAT TREATING CO., 1740-46 W. Hubbard St., Chicago, Ill.

CRITICAL MACHINE
PARTS UTILIZE

AIRKOOL

FOR EXTREME WEAR
RESISTANCE AND TOUGHNESS

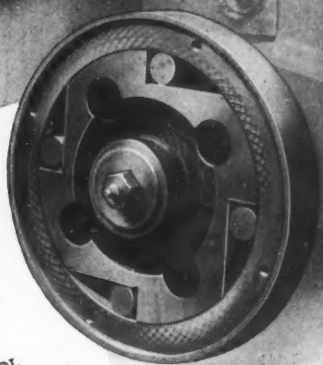
PRODUCTION MEN, MASTER MECHANICS and ENGINEERS are today concerned with maintaining machines straining under unequaled production demands. On critical parts requiring too frequent replacements, many are turning to some of the newer tool and die steels on applications formerly served by alloy steels. Many such interesting examples concern Crucible's AIRKOOL.

Thousands of Tool and Die Makers know AIRKOOL as the unusually tough steel that's readily machinable with minimum distortion and unusual wearing properties. Outstanding too, is its simple air hardening treatment. Now these same properties are being profitably applied by PRODUCTION MEN, MASTER MECHANICS and ENGINEERS for important machine parts.

Pictured here are two such examples where AIRKOOL's properties fit the all-around requirements of the job better than high quality alloy steels. Among other typical applications are lathe centers, indexing cams and medium-stressed spindles where wear resistance is the primary factor.

With down-time doubly dangerous today, check your maintenance department and discover what parts are being requisitioned for constant replacements. The result may surprise you! Then call our nearby representative to discuss AIRKOOL's possibilities on each job. Free folder TS 201 on request.

ATTENTION !
✓ Production Men
✓ Master Mechanics
✓ Engineers



AIRKOOL CAM

5 1/2" diameter, 1 1/4" thick, weight 6 lbs. The service requirements are extreme resistance to wear and toughness. Too, this part with thick and thin sections was difficult to harden. Complications with previously used Alloy Steels were solved with AIRKOOL.

VISIBLE TAP BODY OF AIRKOOL

1/2" thick, weight 25 lbs. chosen because it gave greater strength on the bearing surfaces. Distortion was less and 80% improvement over standard steel formerly used. Considerable savings in costly shipping.



CRUCIBLE STEEL COMPANY

BUILDING - 405 LEXINGTON AVENUE - NEW YORK CITY
WAREHOUSES AND DISTRIBUTORS IN PRINCIPAL CITIES



of America

CONSULT TELEPHONE DIRECTORY OR
THOMAS REGISTER FOR NEAREST OFFICE

UP TO 28 TONS CAPACITY

NIAGARA MASTER "A" SERIES INCLINABLE PRESSES



UP TO 160 TONS CAPACITY



PATENTED

PATENTED

Prosser

CARBIDE TOOL GRINDER



Announcing the New Heavy Duty

The "big brother" of our famous Model AA Carbide Grinder. Has all the features of the smaller machine . . . plus ample power for heaviest tools . . . provision for wet grinding . . . quick-acting indexing tables . . . high grade ball bearing spindle, with double V-belt drive.

Removes metal fast when rough grinding.

Finish grinds smooth keen cutting edges.

Write for complete details.

THOMAS PROSSER & SON

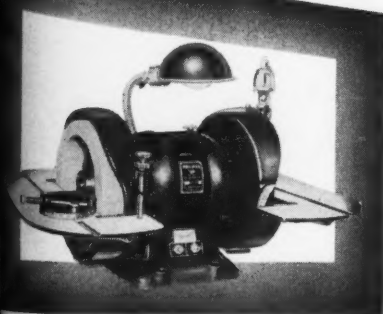
120 WALL ST. NEW YORK

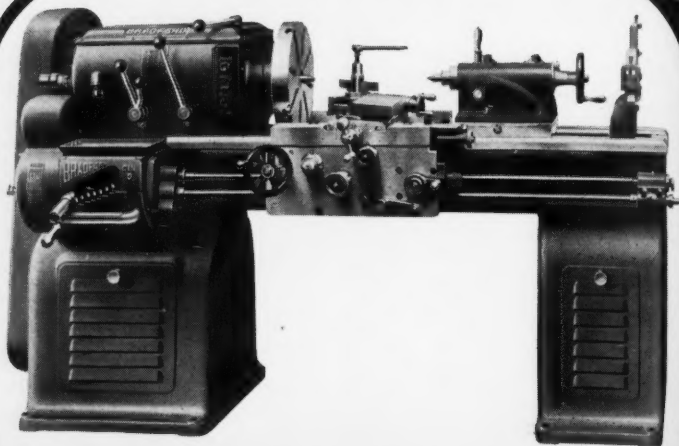
**Famous MODEL AA
CARBIDE GRINDER**

\$99.50

10 Days Free Trial

This grinder will quickly pay for itself by increased tool performance and life between grinds. *Write for details.*





BRADFORD

New Geared Head Lathes

12 speeds—16 to 400 r.p.m. (Higher ranges can be furnished.)

Timken Bearings or Taper Bronze Bearings on high carbon steel main spindle.

Hardened alloy steel shaved gears running in oil. Vee belt drive from constant speed reversible standard Nema frame motor mounted in cabinet leg under headstock.

Provision for convenient lubrication of all wearing surfaces.


Quick-change gear box arranged for selective feeds and thread-cutting; range of threads and feeds unlimited.

Screw cutting and feed without removal of a gear.

BRADFORD MACHINE TOOL CO.
CINCINNATI • OHIO
ESTABLISHED 1840

Also: Unit Type Drilling and Tapping Equipment.
Dealers wanted for some territories.

GOOD CUTTERS ARE VITAL FOR TODAY'S PRODUCTION



—To obtain **More** and **Better** work
put **reliable** Brown & Sharpe Cutters
on every job . . . they help good
machines give maximum output.

Catalog No. 33 shows the complete line.

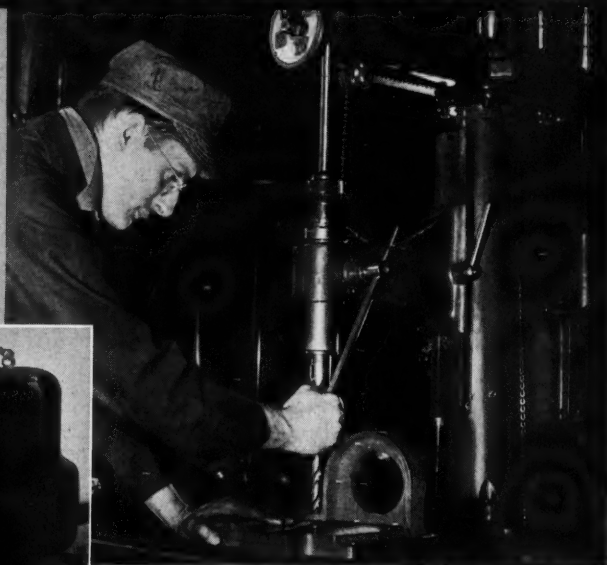


Copy gladly sent on request.

Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A.

BROWN & SHARPE CUTTERS

FOR *Full Range* DRILLING



BACK GEAR UNIT

8 Standard speeds
from 185 to 2300.

High speed range
from 277 to 3450.

● High production on today's work needs rapid changes from speed to speed for greatest efficiency on every job.

These machines are built sturdy enough to use the highest speeds and feeds that modern cutting tools will stand.

Our capacity makes it possible to meet delivery requirements for the present new tooling demand. Wire or phone for full information.

THE FOOTE-BURT COMPANY, Cleveland, Ohio
DETROIT OFFICE: 4-151 GENERAL MOTORS BUILDING

FOOTBURT

Sensitive
DRILLING MACHINES

Height-1
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48 p
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SIZE

Swag

9"

10"

13"

14 1/4"

16"

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OUTH
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Today You Need **SPEED**



IN YOUR SHOP EQUIPMENT

NOW, more than ever, you need shop machinery that will produce more in less time. High spindle speeds are essential for the efficient use of modern sintered carbide and diamond cutting tools. Smooth, vibration-free operation at high speed is achieved in South Bend Lathes by using a direct belt drive to the spindle, a precision balanced spindle assembly and spindle bearing surfaces that are hardened, ground and superfinished to a smoothness of five micro-inches (.000005").

Eight-10" Swing, 1" Collet Capacity South Bend Room Precision Bench Lathe. This lathe has spindle speeds ranging from 50 to 1357 RPM, 1 1/2" hole through spindle, 1" maximum lat capacity, 48 power longitudinal carriage feeds, 48 power cross feeds, and cuts 48 different sizes of screw threads.

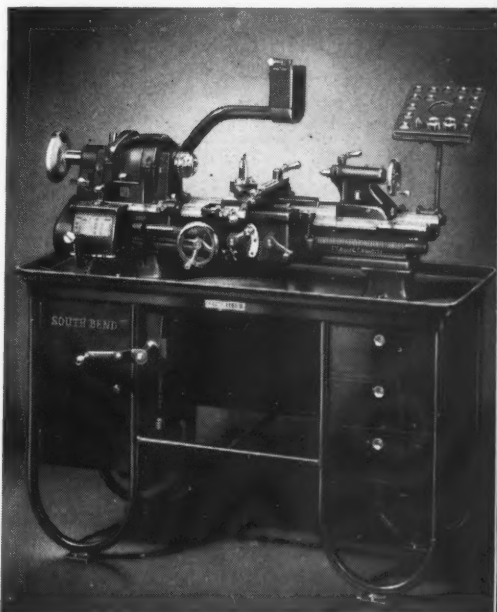
SIZES OF SOUTH BEND LATHES

Swag	Bed Lengths	Center Distances
8"	3' to 4 1/4'	16" to 34"
10"	3' to 4 1/4'	15 1/4" to 33 1/4"
13"	4' to 7'	16" to 52"
14 1/4"	5' to 10'	24 1/4" to 84 1/4"
18"	6' to 12'	33 1/2" to 105 1/4"

PARTIAL LIST OF DEALERS

See South Bend Lathe before you buy. Write today for free catalog and name of nearest dealer.

Boston, Md. — Carey Mach. & Supply
 Boston, Mass. — South Bend Lathe Works*
 Chicago, Ill. — A. C. Birgeood
 New York, N.Y. — E. C. Neal Company, Inc.
 St. Louis, Mo. — South Bend Lathe Works
 Cleveland, Ohio — Reynolds Mach. Co.
 Cincinnati, Ohio — C. H. Geisler Mach. Co.
 Detroit, Mich. — Lee Machinery Company
 Los Angeles, Cal. — Eccles & Davies Mach.
 Milwaukee, Wis. — W. A. Voell Mach. Co.
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 St. Paul, Minn. — Robinson, Cary & Sands
 San Francisco, Cal. — Moore Mach. Co.
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 Syracuse, N.Y. — H. A. Smith, Machinery
 York, Pa. — York Machinery & Supply Co.
 Sales Office: 67 Broadway, Kendall Sq., Cambridge, Mass., Tel. Trowbridge 6369
 Sales Office: Room 308, Machinery Sales Building, Telephone State 7238

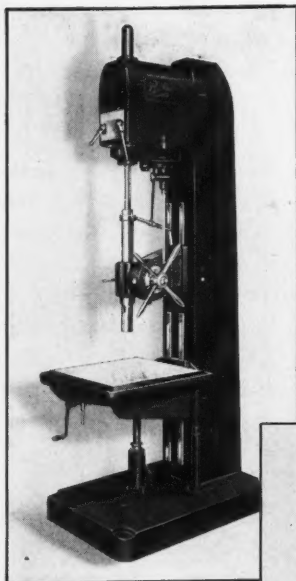


SOUTH BEND LATHE WORKS Lathe Builders Since 1906

371 E. Madison Street, South Bend, Indiana, U. S. A.



Meeting Today's Cry for Faster DRILLING



•Above: New Buffalo "RPMster" Variable Speed Drill; two sizes. Pedestal type only; one to six spindles.

•Center: Buffalo Motor Spindle Drill; two sizes; Pedestal models only; one to six spindles.

•Right: Buffalo Six Spindle No. 16 Power Feed Drill. Sturdy construction plus convenient operation, plus accuracy make No. 16 Drills favorites in many shops.

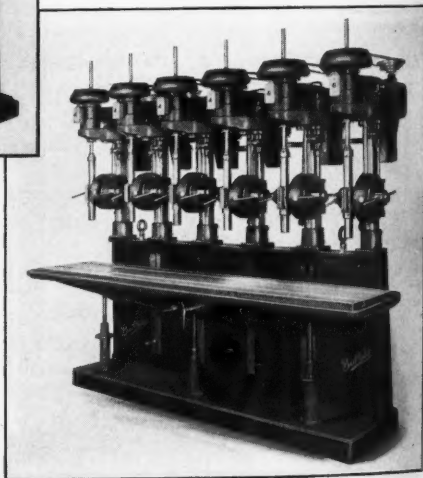


BUFFALO FORGE CO.

388 Broadway

Buffalo • New York

Canadian Blower & Forge Co., Ltd.
Kitchener, Ont.



"Buffalo"

DRILLING MACHINES

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proof in
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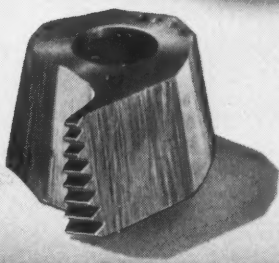
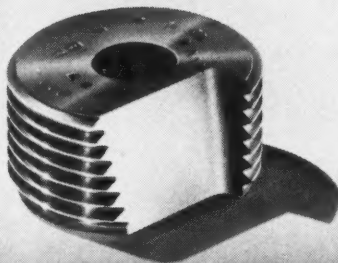
351,000 Pieces

WITH ONE SET

NAMCO CIRCULAR CHASERS



Thread cut on rough diam.
— malleable iron.



Chaser cost—2¢ per 1,000 pieces

"And that's something to talk about." So says J. Jacobson, President, Union Malleable Mfg. Company, Ashland, Ohio.

Namco Circular Chasers give you 270° usable grinding surface. The used chaser here shown was ground more than 200 times.

Each chaser is checked before and after each grind with a micrometer fixture. You take off as little as .015" per grind. When you replace chasers in die head they are identical—ready to go. This eliminates scrap and minimizes time loss between grinds.

These economies plus the simple rugged construction of Namco precision die heads account for the fact that executives of companies who couple modern tooling methods with efficient operation are proud to say, "our shop is 100% Namco die equipped."

Find out about saving on your jobs.



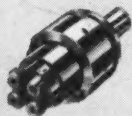
Style DS, sizes
 $\frac{1}{16}$ " - $\frac{1}{4}$ "

Style DR, sizes
.056 - $\frac{1}{4}$ "



Style DBS, sizes
.056 - $\frac{1}{16}$ "

Style RSP Tap
sizes $\frac{1}{4}$ " - 5"



Circular Chasers give 10 TIMES
the life of ordinary chasers.

44 page Complete Threading Catalog—D-38. Explains how Circular Chasers and Circular Hollow Milling Cutters are used in same head—

DOUBLE DUTY TOOLS

NATIONAL ACME

170 EAST 131ST STREET • CLEVELAND, O.

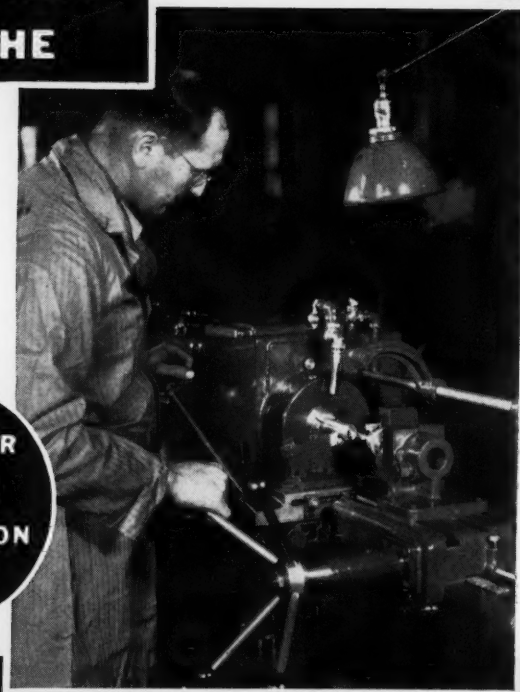
ACME-GRINDLEY 4-6 AND 11 SINGLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • SCREW MACHINE PRODUCTS • THE CHRONOLOG • LIMIT SWITCHES • POSITIVE CENTRIFUGE • CONTRACT MANUFACTURING

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**NEW
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**ASK US FOR
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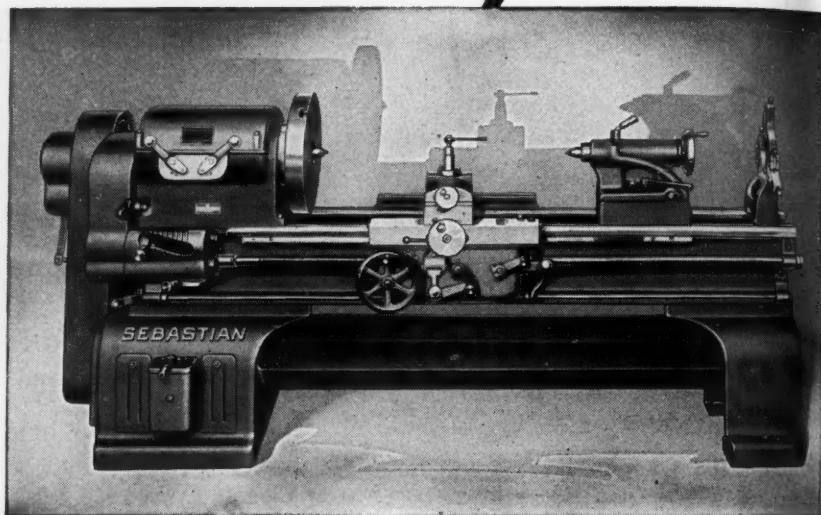
THE OSTER MANUFACTURING CO.

**2061 EAST SIXTY-FIRST PLACE
CLEVELAND • OHIO • U.S.A.**

See

SEBASTIAN LATHES

First!



Here are the principal features of all
SEBASTIAN Type H Lathes . . .

1. Timken Bearings on all shafts in headstock (including spindle) assuring accuracy and from 15% to 20% more power.
2. Oversized heat treated, hardened and shaved steel gears in headstock assuring quiet operation.
3. Knob control handle for apron length feed friction (no springs) gives a positive in and out—very useful when approaching a shoulder.
4. Feeds (12"—.00175 to .111), (14" to 20"—.002 to .252). Threads—3 to 384. Feed and thread changes—72. Accuracy .0005" at every point of alignment.

WRITE FOR COMPLETE DETAILS

THE SEBASTIAN LATHE CO.

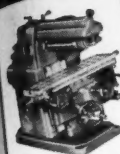
CINCINNATI

OHIO, U. S. A.

Atlas ANNOUNCES NEW MULTIPLE SPINDLE DRILLING MACHINES

2, 3, and 4 SPINDLES
4-BEARING
"Floating Spindle" Heads
New Head Control
Mechanism
Massive Table Construction
Assures Rigidity

TWO OTHER TIMELY Atlas TOOLS

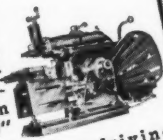


NEW BENCH MILLING MACHINE

Handles full range of milling work. Table working surface 4 1/2" x 18", travel 12" (hand) or 10" (Atlas "Change-O-Matic" feed), cross travel 3 1/2", vertical 6". Prices \$205 to \$225 less motor and arbor.

7" SHAPER

Handles with speed and precision everything from 1/2" to 7" stroke.



Crank type ram-driving mechanism, complete V-belt drive, 4 speeds, 5 automatic cross feeds. Operates from 1/2 HP motor. Price \$265 less motor.



**QUICKLY
PAY THEIR WAY
IN
Increased Production**

Saving motion — re-jigging, reaching, stacking — saving power and set-up time — increases production and reduces costs on drilling and tapping operations with these new Atlas Multiple Spindle Drilling Machines.

Drilling heads have the famous Atlas SKF-equipped floating-drive spindle design with new Atlas head positioning mechanism. Table is precision ground for accurate work with jigs. Prices are \$195, \$310, and \$350 less motors (1/3 or 1/2 HP). Available with Jacobs 0-1/2" chucks or No. 1 Morse taper spindles. Ask your dealer and send for new 1941 catalog with complete details.

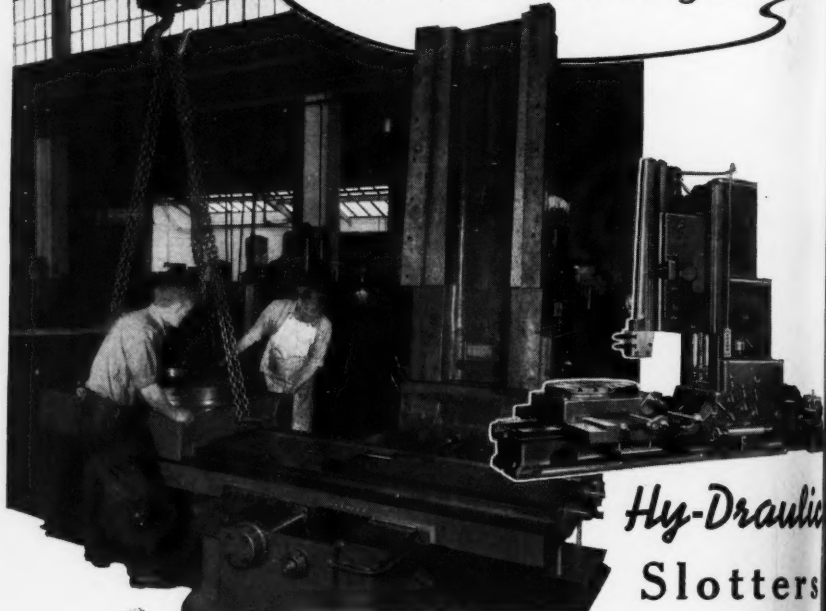
ATLAS PRESS COMPANY

1246 N. PITCHER ST., KALAMAZOO, MICH.
NEW YORK CHICAGO PHILADELPHIA
130 W. 42nd St. 35 E. Wacker at Wabash 113 N. Third St.

QUALITY SHOP EQUIPMENT SINCE 1911

Building Hy-Draulic Machine Tools

...As Fast As It
Can Be Done Right



Hy-Draulic
Slotters



**Write
For
Bulletin 383**

Bulletin shown above illustrates and describes many features and advantages of Hy-Draulic Slotters, contains complete specifications. This valuable information deserves a place in every plant where slotters are used, or can be used. Write for your copy today, Bulletin 383.

On The Ways, And On The Way

Work on the ways for saddle, and cross-slide of a big Hy-Draulic Slotter is shown in progress above... one of many important steps in building Hy-Draulic machine tools as fast as it can be done right. Other Hy-Draulic Slotters are "on the ways", and will soon be "launched" on their respective ways to shipyards, steel mills, railroad or other shops where accurate, fast, economical Slotters are required.

Hydraulic drive and hydraulic feeds combined with unique features of design and construction are available only in Hy-Draulic Slotters. Extremely easy to operate, Hy-Draulic Slotters get out an amazing amount of high quality work in remarkably short time. Investigate. Write today for details and data.

Hy-Draulic

Reg. U. S. Pat. Off.

Shapers... Planers... Slotters... Shaper-Planers

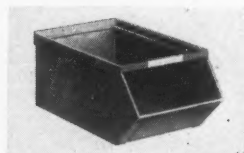
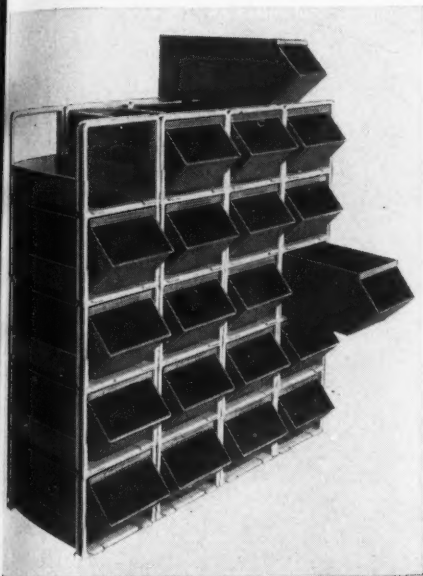
ROCKFORD MACHINE TOOL CO.

ROCKFORD, ILLINOIS, U. S. A.

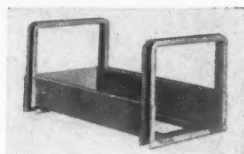
How to Reduce Handling and Speed Inventory Count

Because STACK-BINS are portable containers—not fixtures—parts and materials can be weighed, counted or carried to departments **without being transferred from one container to another!** In the stockroom, STACK-BINS are instantly accessible when the contents are needed—without disturbing any but the wanted one.

Handling is reduced—inventory count is speeded—time and labor costs are cut—with the ideal storage combination, STACK-BINS in STACKRACKS. Carried in stock in 7 sizes.



• **STACKBINS** are individual hopper-fronted stacking bins designed for storage, transportation and assembly.



• **STACKRACKS** are individual units which lock together without the use of tools to form storage racks of any capacity. **STACKBINS** slide into them like drawers.

This patented storage system will start saving money for you at inventory time — and keep saving all year. Write today for complete information and low prices.

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"Stacked and Still Accessible"

ARMSTRONG

Setting-up tools



There is no better way to take profits from overhead than to provide a complete set of ARMSTRONG Setting-Up Tools for your planers, shapers, boring mills, milling machines, band saws, and grinders.

Save Machine and Man Hours wasted while operators pick over the scrap pile seeking setting-up material or "doping-out" make-shift set-ups.

Reduce Loss thru spoilage resulting from poor, inaccurate, or insecure set-ups.

Prevent Accidents caused by inadequate strapping or slippage. The ARMSTRONG Setting-Up Tool Line includes T-slot Bolts, Non-Skid Vertical and Bracing Jacks, Planer (Swivel Head) Jacks, and 6 types of Drop Forged Strap Clamps, all in several sizes.

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ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

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Eastern Warehouse and Sales: 199 Lafayette St., New York



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